Installing and Operating AN/DC and ANH-8/DC Systems

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USA Requirements Only

Federal Communications Commission (FCC) Compliance Notice: Radio Frequency Notice

Note: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy. If it is not installed and used in accordance with the instruction manual, it may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case users will be required to take whatever measures may be necessary to correct the interference at their own expense.

European Requirements Only

EN 55 022 Statement

This is to certify that the Nortel Networks BN router is shielded against the generation of radio interference in accordance with the application of Council Directive 89/336/EEC, Article 4a. Conformity is declared by the application of EN 55 022 Class A (CISPR 22).

Warning: This is a Class A product. In a domestic environment, this product may cause radio interference, in which case, the user may be required to take appropriate measures.

Achtung: Dieses ist ein Gerät der Funkstörgrenzwertklasse A. In Wohnbereichen können bei Betrieb dieses Gerätes Rundfunkstörungen auftreten, in welchen Fällen der Benutzer für entsprechende Gegenmaßnahmen verantwortlich ist.

Attention: Ceci est un produit de Classe A. Dans un environnement domestique, ce produit risque de créer des interférences radioélectriques, il appartiendra alors à l'utilisateur de prendre les mesures spécifiques appropriées.

EC Declaration of Conformity

This product conforms (or these products conform) to the provisions of Council Directive 89/336/EEC and 73/23/EEC.

Japan/Nippon Requirements Only

Voluntary Control Council for Interference (VCCI) Statement

この装置は、情報処理装置等電波障害自主規制協議会（ＶＣＣＩ）の基準
に基づくクラスＡ情報技術装置です。この装置を家庭環境で使用すると電波
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るよう要求されることがあります。

Taiwan Requirements

Bureau of Standards, Metrology and Inspection (BSMI) Statement

警告使用者:

這是甲類的資訊產品, 在居住的環境中使用時, 可能會造成射
頻干擾. 在這種情況下, 使用者會被要求採取某些適當的對策.

Canada Requirements Only

Canadian Department of Communications Radio Interference Regulations

This digital apparatus (BN router) does not exceed the Class A limits for radio-noise emissions from digital apparatus as set out in the Radio Interference Regulations of the Canadian Department of Communications.

Règlement sur le brouillage radioélectrique du ministère des Communications

Cet appareil numérique (BN router) respecte les limites de bruits radioélectriques visant les appareils numériques de classe A prescrites dans le Règlement sur le brouillage radioélectrique du ministère des Communications du Canada.

Canada CS-03 Rules and Regulations

Notice: The Industry Canada label identifies certified equipment. This certification means that the equipment meets telecommunications network protective, operational and safety requirements as prescribed in the appropriate Terminal Equipment Technical Requirements document(s). The Department does not guarantee the equipment will operate to the user's satisfaction.

Before installing this equipment, users should ensure that it is permissible to be connected to the facilities of the local telecommunications company. The equipment must also be installed using an acceptable method of connection. The customer should be aware that compliance with the above conditions may not prevent the degradation of service in some situations.

Canada Requirements Only *(continued)*

Repairs to certified equipment should be coordinated by a representative designated by the supplier. Any repairs or alterations made by the user to this equipment, or equipment malfunctions, may give the telecommunications company cause to request the user to disconnect the equipment.

Users should ensure for their own protection that the electrical ground connections of the power utility, telephone lines and internal metallic water pipe system, if present, are connected together. This precaution may be particularly important in rural areas.

Caution: Users should not attempt to make such connections themselves, but should contact the appropriate electric inspection authority, or electrician, as appropriate.

Notice: For equipment using loopstart lines, please note that the Ringer Equivalence Number (REN) assigned to each terminal device provides an indication of the maximum number of terminals allowed to be connected to a telephone interface. The termination on an interface may consist of any combination of devices subject only to the requirement that the sum of the Ringer Equivalence Numbers of all the devices does not exceed 5. The REN is located on the "FCC Rules Part 68" label located on the bracket of the module, or on the back of the unit.

Canada CS-03 -- Règles et règlements

Avis: L'étiquette d'Industrie Canada identifie le matériel homologué. Cette étiquette certifie que le matériel est conforme aux normes de protection, d'exploitation et de sécurité des réseaux de télécommunications, comme le prescrivent les documents concernant les exigences techniques relatives au matériel terminal. Le Ministère n'assure toutefois pas que le matériel fonctionnera à la satisfaction de l'utilisateur.

Avant d'installer ce matériel, l'utilisateur doit s'assurer qu'il est permis de le raccorder aux installations de l'entreprise locale de télécommunication. Le matériel doit également être installé en suivant une méthode acceptée de raccordement. L'abonné ne doit pas oublier qu'il est possible que la conformité aux conditions énoncées ci-dessus n'empêche pas la dégradation du service dans certaines situations.

Les réparations de matériel homologué doivent être coordonnées par un représentant désigné par le fournisseur. L'entreprise de télécommunications peut demander à l'utilisateur de débrancher un appareil à la suite de réparations ou de modifications effectuées par l'utilisateur ou à cause de mauvais fonctionnement.

Pour sa propre protection, l'utilisateur doit s'assurer que tous les fils de mise à la terre de la source d'énergie électrique, des lignes téléphoniques et des canalisations d'eau métalliques, s'il y en a, sont raccordés ensemble. Cette précaution est particulièrement importante dans les régions rurales.

Avertissement: L'utilisateur ne doit pas tenter de faire ces raccordements lui-même; il doit avoir recours à un service d'inspection des installations électriques, ou à un électricien, selon le cas.

Avis: Veuillez prendre note que pour tout appareillage supportant des lignes de type "loopstart," l'indice d'équivalence de la sonnerie (IES) assigné à chaque dispositif terminal indique le nombre maximal de terminaux qui peuvent être raccordés à une interface. La terminaison d'une interface téléphonique peut consister en une combinaison de quelques dispositifs, à la seule condition que la somme d'indices d'équivalence de la sonnerie de tous les dispositifs n'excède pas 5. Le REN figure sur l'étiquette "FCC Rules Part 68" située sur le support du module ou à l'arrière de l'unité.

FCC Part 68 Compliance Statement

This equipment complies with Part 68 of FCC Rules. All direct connections to telephone network lines must be made using standard plugs and jacks compliant with FCC Part 68. Please note the following:

1. You are required to request service from the telephone company before you connect the unit to a network. When you request service, you must provide the telephone company with the following data:

   • When you request T1 Service, you must provide the telephone company with

     -- The Facility Interface Code

        Provide the telephone company with all the codes below:

        - 04DU9-BN (1.544 MB, D4 framing format)
        - 04DU9-DN (1.544 MB, D4 framing format with B8ZF coding)
        - 04DU9-1KN (1.544 MB, ESF framing format)
        - 04DU9-1SN (1.544 MB, ESF framing format with B8ZF coding)
        - 04DU9-1ZN (1.544 MB, ANSI ESF and ZBTSI without line power)

        The telephone company will select the code it has available.

     -- The Service Order Code(s) (SOC): 6.0F

     -- The required Universal Service Order Code (USOC) jack: RJ48C

   • When you request Primary Rate ISDN Service, you must provide the telephone company with

     -- The Facility Interface Code: 04DU9-1SN (1.544 MB, ESF framing format with B8ZF coding)

     -- The Service Order Code(s) (SOC): 6.0F

     -- The required Universal Service Order Code (USOC) jack: RJ48C

2. Your telephone company may make changes to its facilities, equipment, operations, or procedures that could affect the proper functioning of your equipment. The telephone company will notify you in advance of such changes to give you an opportunity to maintain uninterrupted telephone service.

3. If the unit causes harm to the telephone network, the telephone company may temporarily discontinue your service. If possible, they will notify you in advance, but if advance notice is not practical, you will be notified as soon as possible and will be informed of your right to file a complaint with the FCC.

4. If you experience trouble with the unit, please contact the Nortel Networks Technical Solutions Center in your area for service or repairs. Repairs should be performed only by service personnel authorized by Nortel Networks.

United States	1-800-2LANWAN
Valbonne, France	33-4-92-96-69-68
Sydney, Australia	61-2-9927-8800
Tokyo, Japan	81-3-5740-1700

5. You are required to notify the telephone company when you disconnect the unit from the network.

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Preface

Read this guide for instructions on how to install, start, and operate Access Node or 8-Port Access Node Hub models that have a single DC input switching power supply, the AN™/DC and ANH™-8/DC. This guide describes

- Physically installing the AN/DC (Chapter 1) or the ANH-8/DC (Chapter 2) and attaching communications equipment

- Connecting the AN/DC or ANH-8/DC to the network using one of the Site Manager software configuration options (Chapter 3)

- Using the AN/DC or ANH-8/DC operator switches and interpret LED displays (Chapter 4)

Before You Begin

Before using this guide, you must complete the following procedures. For a new router:

- Install the router (see the installation guide that came with your router).

- Connect the router to the network and create a pilot configuration file (see *Quick-Starting Routers*, *Configuring Remote Access for AN and Passport ARN Routers*, or *Connecting ASN Routers to a Network)*.

Make sure that you are running the latest version of Nortel Networks BayRS™ and Site Manager software. For information about upgrading BayRS and Site Manager, see the upgrading guide for your version of BayRS.

Text Conventions

This guide uses the following text conventions:

angle brackets (< >) Indicate that you choose the text to enter based on the description inside the brackets. Do not type the brackets when entering the command.

Example: If the command syntax is:
ping <*ip_address*>, you enter:
ping 192.32.10.12

bold text Indicates command names and options and text that you need to enter.

Example: Enter **show ip** {**alerts** | **routes**}.

Example: Use the **dinfo** command.

brackets ([ ]) Indicate optional elements in syntax descriptions. Do not type the brackets when entering the command.

Example: If the command syntax is:
show ip interfaces [**-alerts**], you can enter either:
show ip interfaces or **show ip interfaces -alerts**.

italic text Indicates file and directory names, new terms, book titles, and variables in command syntax descriptions. Where a variable is two or more words, the words are connected by an underscore.

Example: If the command syntax is:
show at <*valid_route*>
valid_route is one variable and you substitute one value for it.

`screen text`	Indicates system output, for example, prompts and system messages.
	Example: `Set Trap Monitor Filters`
vertical line (│)	Separates choices for command keywords and arguments. Enter only one of the choices. Do not type the vertical line when entering the command.
	Example: If the command syntax is: **show ip** {**alerts** │ **routes**}, you enter either: **show ip alerts** or **show ip routes**, but not both.

Acronyms

This guide uses the following acronyms:

AN/DC	Access Node (AN) with DC power supply
ANH-8/DC	8-Port Access Node Hub (ANH) with DC power supply
ANSI	American National Standards Institute
AUI	Attachment Unit Interface
BootP	Bootstrap Protocol
BRI	Basic Rate Interface
CCITT	(now ITU-T)
CSMA/CD	carrier sense multiple access with collision detection
CTS	clear to send
DCD	data carrier detect
DCE	data communications equipment
DCM	RMON Data Collection Module
DLCMI	Data Link Control Management Interface
DSR	data set ready
DTE	data terminal equipment
DTR	data terminal ready
EIA	Electronic Industries Association
GUI	graphical user interface
HDLC	high-level data link control

IEEE	Institute of Electrical and Electronic Engineers
IP	Internet Protocol
ISDN	Integrated Services Digital Network
ISO	International Organization for Standardization
ITU-T	International Telecommunication Union –Telecommunication (formerly CCITT)
LAN	local area network
LED	light-emitting diode
LMI	Local Management Interface
MAC	media access control
MAU	media access unit
MDI	Medium-Dependent Interface
MDI-X	Medium-Dependent Interface with Crossover
NBMA	non broadcast multi-access
NEMA	National Electrical Manufacturers Association
NVFS	Nonvolatile File System
OSI	Open Systems Interconnection
OSPF	Open Shortest Path First Protocol
PCMCIA	Personal Computer Memory Card International Association
PPP	Point-to-Point Protocol
RIP	Routing Information Protocol
RLSD	received line signal detection
RTS	request to send
SMDS	switched multimegabit data service
SNMP	Simple Network Management Protocol
STP	shielded twisted-pair
TCP/IP	Transmission Control Protocol/Internet Protocol
TELNET	Telecommunication Network
TFTP	Trivial File Transfer Protocol
TPE	twisted-pair Ethernet
UTP	unshielded twisted-pair
WAN	wide area network

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How to Get Help

If you purchased a service contract for your Nortel Networks product from a distributor or authorized reseller, contact the technical support staff for that distributor or reseller for assistance.

If you purchased a Nortel Networks service program, contact one of the following Nortel Networks Technical Solutions Centers:

Technical Solutions Center	Telephone
EMEA	(33) (4) 92-966-968
North America	(800) 2LANWAN or (800) 252-6926
Asia Pacific	(61) (2) 9927-8800
China	(800) 810-5000

An Express Routing Code (ERC) is available for many Nortel Networks products and services. When you use an ERC, your call is routed to a technical support person who specializes in supporting that product or service. To locate an ERC for your product or service, go to the www12.nortelnetworks.com/ URL and click ERC at the bottom of the page.

Chapter 1
Installing the AN/DC

This chapter describes how to install the AN/DC.

> ⚠ **Danger:** Due to high-energy hazards, only qualified service personnel are permitted to install the AN/DC.

Topics in this chapter include

- [Preparing for Installation](#)
- [Installing the AN/DC](#) (on a desktop, in a rack, or on the wall)
- [Connecting Communications Cables](#)
- [Connecting a Management Console or Modem](#)
- [Connecting to the DC Power Source](#)

For information on how to install the ANH-8/DC, go to Chapter 2. For technical specifications and an overview of the AN/DC hardware, refer to Appendix C.

Preparing for Installation

To prepare for installation, complete the steps in the next sections to verify that:

- The AN/DC shipment is complete and undamaged.
- You have the proper tools and equipment.
- The installation location meets all site requirements.

Verifying Shipment Contents

Verify that the items you receive match the items in the packing list attached to the shipping container.

1. **Inspect all items for any shipping damage.**

Caution: In particular, check the AN/DC for any damage to the ports on the back panel. If you detect damage, do not install the AN/DC. Call your local Nortel Networks Technical Response Center.

2. **Make sure that your shipping package contains the following items:**

   - Mounting hardware (Figure 1-1).
   - Console/modem cable kit (Figure 1-2).
   - Any network cables ordered with the router. If you do not have the appropriate network cables, contact your network administrator.
   - Warranty information.
   - This guide.

Four rubber feet
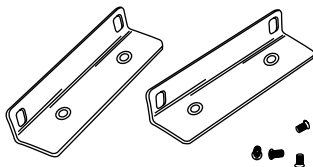
Two flange backets
(for installing the AN in an
equipment rack or
mounting it on a wall)
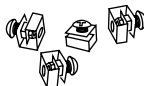
Four cagenuts with screws
(for installing the AN in an
equipment rack)
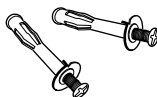
2 wall anchors
(for mounting the AN on a wall)

AN0001A

Figure 1-1.   Mounting Hardware

AN0002A
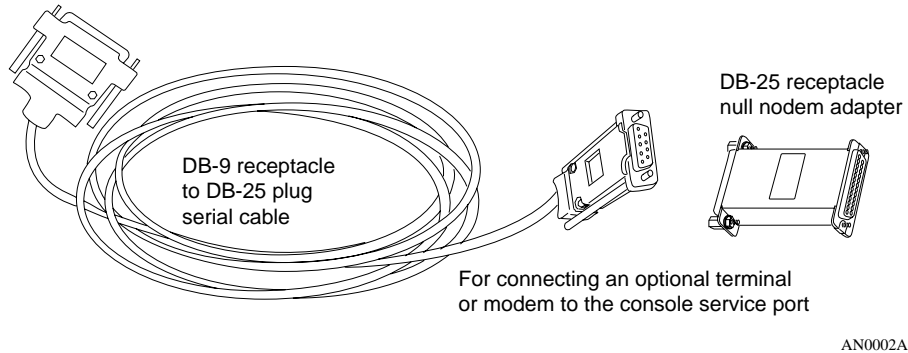
Figure 1-2.   Console Cables

Supplying Tools and Equipment

You may need items that are not part of the ANH-8/DC shipping accessories. Before installing the ANH-8/DC hardware, ensure that you have all the cables, tools, and other equipment that you need at your site.

Tools

Gather the tools that you will need to set up an AN/DC at your site, such as:

- Flathead screwdriver, for attaching network cables

- Phillips screwdriver, for attaching brackets to rack- or wall-mount the AN/DC

- Electric drill, if you intend to mount the AN/DC on a wall

Cables

Unless they were specifically ordered, the Ethernet and synchronous cables necessary for your network configuration are not part of the AN/DC shipping accessories. If you do not have the proper cables, contact your network administrator or see the *Cable Guide for Routers and BNX Platforms.*

Service Console

You can attach an optional VT-100 console or equivalent to the AN/DC to monitor the results of startup diagnostics and perform manual boot configurations; or you can attach any AT-compatible modem to allow remote dial-in access to diagnostics and configuration.

➡ **Note:** To use the Netboot, Directed Netboot, or Local Boot configuration options (see Chapter 3), there must be a local terminal connected the first time that the ANH-8/DC powers up.

Mounting Hardware

To rack-mount the AN/DC, you need an electronic enclosure rack that meets the following specifications:

- Heavy-duty steel construction

- Electronic Industries Association (EIA) standard hole-spacing

- Width of 19 in. (48.26 cm) and depth of 24 in. (60.96 cm)

If the rack's rails do not have threaded holes, you must supply cagenuts to use with the cagenut screws (see Figure 1-4).

Verifying Site Requirements

Verify that your installation meet the requirements listed in this section.

- Space Requirements

- Electrical Requirements

- Environmental Requirements

➡ **Note:** The AN/DC should be installed only in dedicated equipment rooms where access is limited to qualified service personnel.

Space Requirements

The installation site must provide a certain amount of free space around the AN/DC to dissipate heat. Install the AN/DC in a space that meets the following specifications:

- Width: 19.5 in. (49.6 cm)
- Minimum depth: 15.5 in. (39.3 cm)
- Depth for servicing: 24.5 in. (62.2 cm)

Electrical Requirements

The installation site must provide an isolated power source that meets these electrical specifications:

- Input voltage of -48.0 or -60.0 volts DC, +/- 20%
- 1.5 amperes (A) input current under full load at -38.0 VDC input
- Reinforced insulation from the main AC power

We recommend the use of #16 AWG cables between the AN/DC and the power source to minimize voltage drop. When measuring the cable run, be certain to include both the input and return cables.

Environmental Requirements

The AN/DC installation site must meet the following specifications:

- Altitude: 0 to 8,000 ft (0 to 2,438.4 m)
- Humidity: 10% to 90%, noncondensing
- Temperature: 32°F to 104°F (0°C to 40°C) stable

Installing the AN/DC

With all cabling attached, you can install the AN/DC in any of the following ways:

- Position the AN/DC on a flat, sturdy surface.

- Install the AN/DC in an electronic enclosure rack.

- Mount the AN/DC on a wall.

The following sections provide instructions for each option. Refer to the appropriate section when positioning your AN/DC.

Positioning the AN/DC on a Flat Surface

To position the AN/DC on a flat surface:

1. **Make sure that the surface is large enough for the AN/DC to operate properly.**

    The surface must be sturdy enough to support the combined weight of the AN/DC and any cables you connect.

2. **Peel the paper backing off the four rubber feet supplied with the AN/DC and attach them to the embossed feet on the bottom of the AN/DC.**

3. **Set the AN/DC in the chosen location.**

You can now connect the network cables to the AN/DC. Go to the section "Connecting Communications Cables," later in this chapter.

Installing the AN/DC in a Rack

For this procedure, you need

- Mounting hardware that came with the AN/DC shipment

- An electronic enclosure rack

- Phillips screwdriver

> ➡ **Note:** If the rack's rail does not have threaded holes, you must supply and attach four cagenuts.

To install the AN/DC in a rack:

1. **Attach each flange bracket to the AN/DC (Figure 1-3) as follows:**

    a. **Align the flange holes with the AN/DC mounting holes.**

    b. **Insert a flange screw through each flange hole and into the AN/DC.**

    c. **Tighten each flange screw with a Phillips screwdriver.**
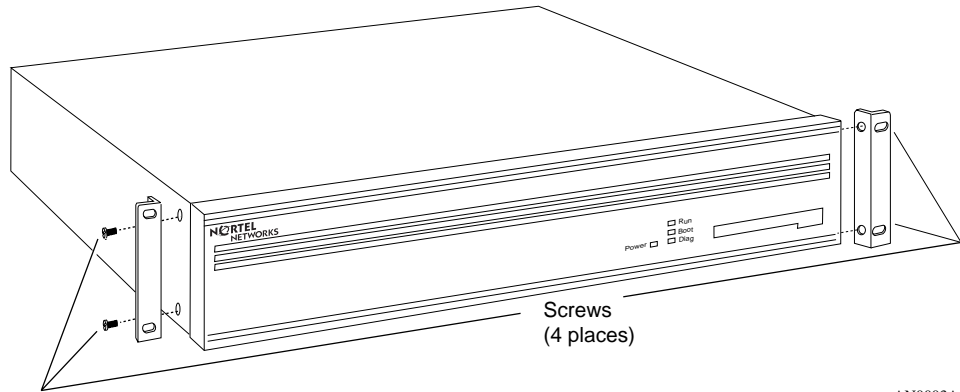
AN0003A

Figure 1-3.   Attaching Flange Brackets to the AN/DC

2. **Place the AN/DC in the rack, aligning the flange holes with the holes in the front vertical supports of the rack (Figure 1-4).**

3. **Insert a cagenut screw through each flange hole and into the corresponding holes in the front vertical supports of the rack.**

➡️ **Note:** If the rack's rail does not have threaded holes, use the cagenuts along with the cagenut screws. Otherwise, just use the cagenut screws.

4. **Tighten each cagenut screw with a Phillips screwdriver.**
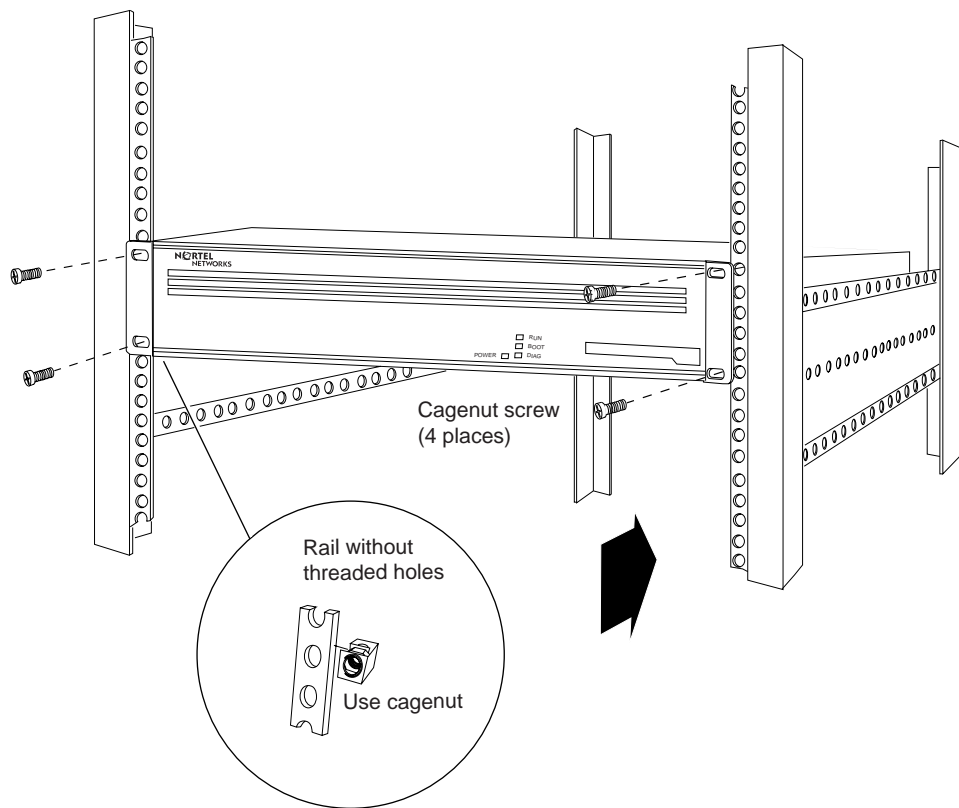
AN0004A

Figure 1-4.   Installing the AN/DC in a Rack

You can now connect the network cables to your AN/DC. Go to the section "Connecting Communications Cables," later in this chapter.

Mounting the AN/DC on a Wall

When mounting the AN/DC on a wall, keep the following in mind:

- Make sure that the wall is at least 3/8 in. (0.96 cm) thick, and is made of Sheetrock or wood.

- You need the following equipment before you start:

    -- An electric drill

    -- A Phillips screwdriver

    -- Two wall-mount anchors

To mount the AN/DC on the wall:

1. **Drill two 5/16-in. (0.8 cm) holes in the wall 5-1/4 in. (13.34 cm) apart, at least 3 ft. (0.915 m) off the floor.**

2. **Insert one wall-mount anchor into each hole.**

3. **Tighten the anchors with a Phillips screwdriver.**

4. **Back the head of each screw out 1/8 in. (0.32 cm) from the wall.**

5. **Hang the AN/DC on the wall by aligning the keyhole cutouts on the back of the AN/DC with the protruding screw heads (Figure 1-5).**
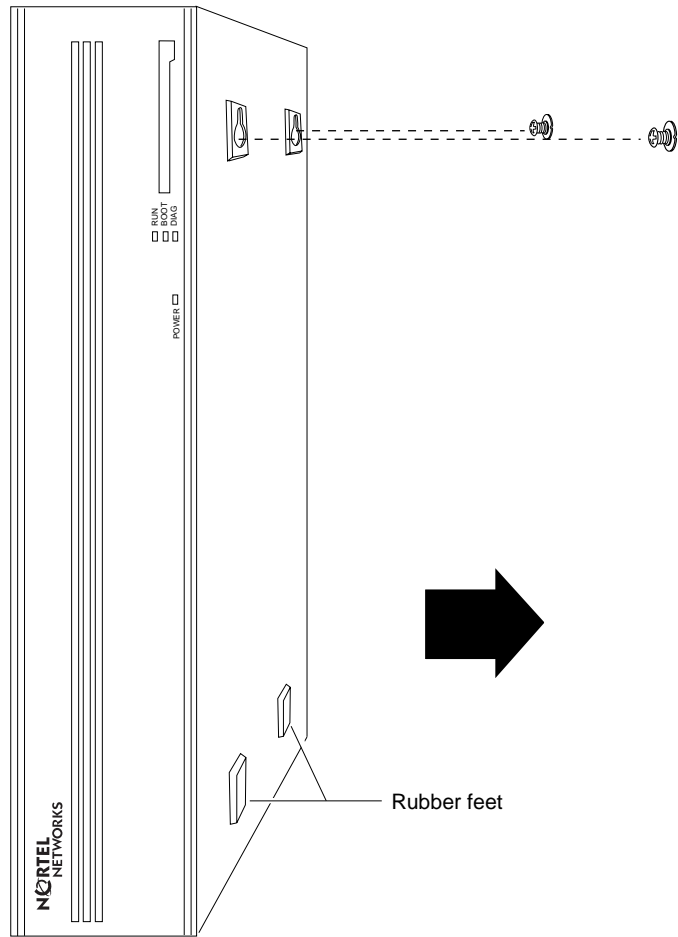
AN0005A

Figure 1-5.   Mounting the AN/DC on a Wall

Connecting Communications Cables

To connect network cables to the back of the AN/DC:

1. **Connect the appropriate cables for your network configuration to the communications ports on the back of the AN/DC (Figure 1-6).**

    For some cables, you may need a flathead screwdriver to secure the connector in place. Figure 1-6 illustrates a sample cable configuration. Appendix C describes and provides more detail on the communications ports available on the different AN/DC models.
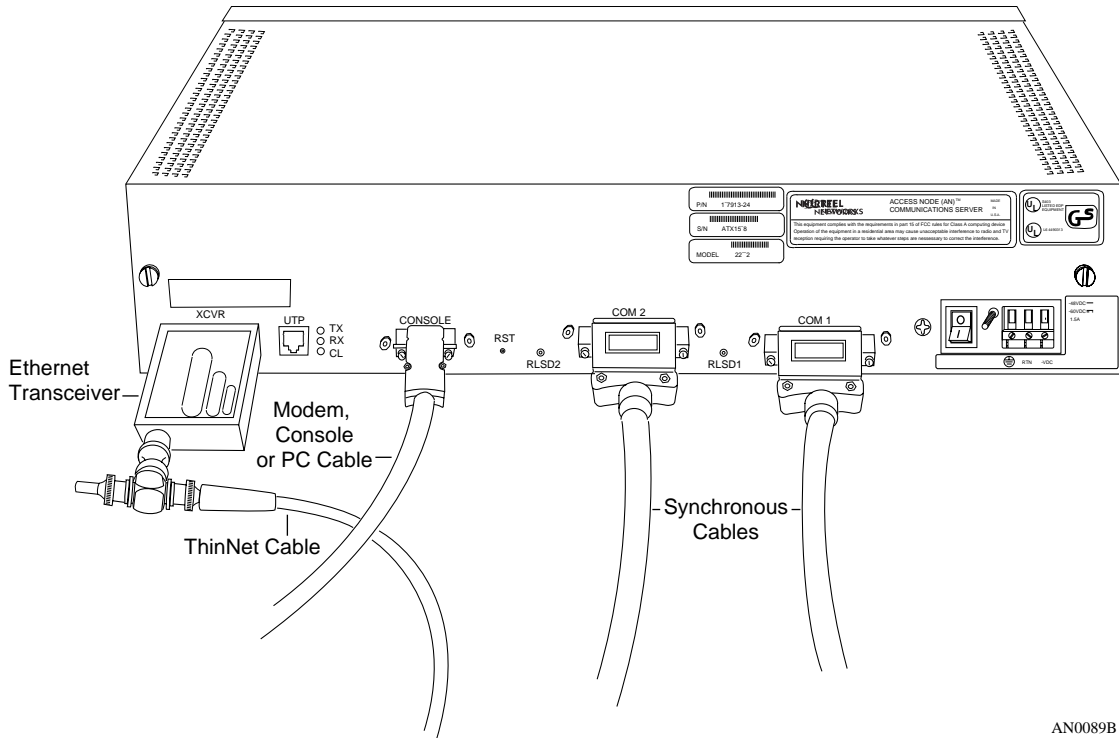
Figure 1-6.   Plugging Cables into the AN/DC

2. **Connect the network cables to the physical network.**

    Contact your network administrator or see the *Cable Guide for Routers and BNX Platforms* if you need assistance in connecting the AN/DC to the physical network devices, or if you are missing any network cables.

Connecting a Management Console or Modem

Use the front-panel console port to connect an ASCII-based terminal, a personal computer terminal emulator, or a modem to the AN/DC. Using a local terminal, you can monitor the results of startup diagnostics and set the boot configuration. Using an attached modem, you can allow remote dial-in access to diagnostics.

To determine whether you need to connect a console to the AN/DC, contact your network administrator to find out which software configuration option (EZ Install, Netboot, Directed Netboot, or Local Boot) is best for your site.

Refer to Chapter 2 for information on the software configuration options. You must connect a console to the AN/DC to use Netboot, Directed Netboot, or Local Boot.

Although you do not need a console or modem connection for EZ Install, we strongly recommend that you connect a console or modem to the AN/DC. This lets you issue commands to the AN/DC and view messages.

→ **Note:** To use the Netboot, Directed Netboot, or Local Boot software configuration options, you must connect a console the first time you power up the AN/DC, as described in Chapter 3.

Complete the steps in one of the following sections:

- Connecting a Terminal Console
- Connecting a PC Console
- Connecting a Modem

Connecting a Terminal Console

To connect a console, you need both pieces in the AN/DC console/modem cable kit (Order No. 110310) that shipped with the router (refer to Figure 1-2):

- Order No. 110307 serial console/modem cable (with 9-pin receptacle to 25-pin plug connectors)

- Order No. 110308 null modem crossover adapter (with two 25-pin receptacle connectors)

Once you have the appropriate equipment, complete the following steps:

1. **Power on and configure the console, using the parameters in Table 1-1.**

   Refer to the console user manual for instructions.

Table 1-1.   Console Parameters

Parameter	Value
Baud Rate	9600
Data Bits	8
Stop Bits	1
Parity	None

2. **Power off the console.**

3. **Attach the null modem crossover adapter to the 25-pin cable connector (Figure 1-7).**

4. **Insert the screws on the cable connector into the receptacle on the adapter connector and tighten each screw.**

Console cable connector   Null modem crossover adapter

Rotate to tighten screw   Screw receptacle

AN0010A
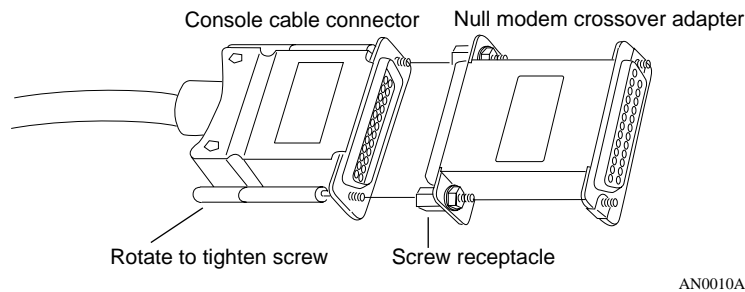
Figure 1-7.   Attaching the Modem Adapter to the Console Cable

5. **Insert the 9-pin receptacle end of the console cable into the CONSOLE port on the back panel of the AN/DC (Figure 1-8).**
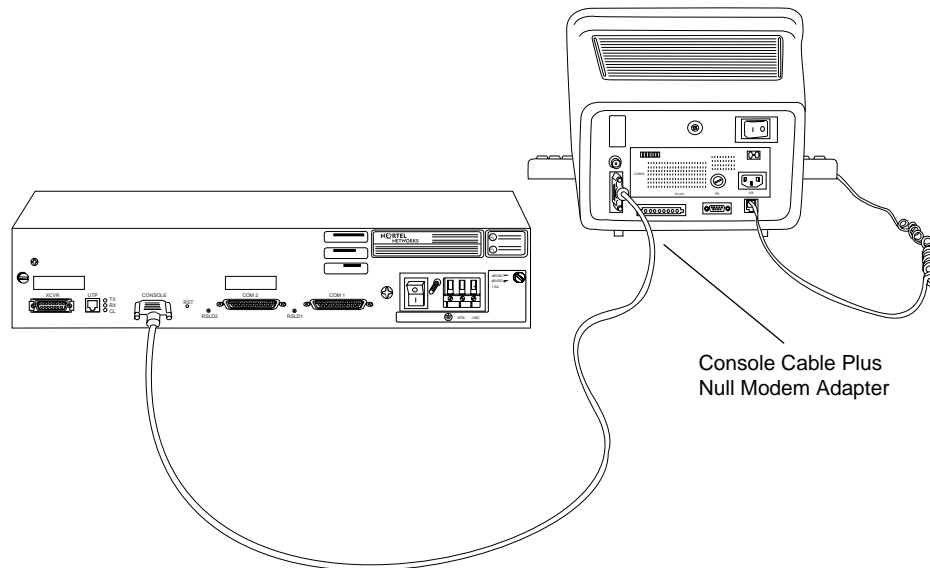
AN0011B

Figure 1-8.   Connecting a Terminal Console

6. Attach the 25-pin receptacle connector on the combined cable and adapter to the terminal's host connector.

The console is now connected. Proceed to the section "Connecting to the DC Power Source."

Connecting a PC Console

To connect a PC, you need both pieces in the console/modem cable kit that shipped with the router (Nortel Networks Order No. 110310):

•   Order No. 110307 serial console/modem cable (with 9-pin receptacle to 25-pin plug connectors)

•   Order No. 110308 null modem crossover adapter (with two 25-pin receptacle connectors)

You also need another standard serial cable with a 25-pin plug connector.

Once you have the appropriate equipment, complete the following steps:

1. **Insert the 9-pin receptacle end of the console cable into the CONSOLE port on the AN/DC back panel (Figure 1-9).**

2. **Attach the null modem crossover adapter to the other end of the console cable (refer to Figure 1-7).**

3. **Attach the 25-pin receptacle end of the cable-plus-adapter to the PC console cable's 25-pin plug connector.**

4. **Connect the complete cable unit to the communications port at the back of the PC (Figure 1-9).**
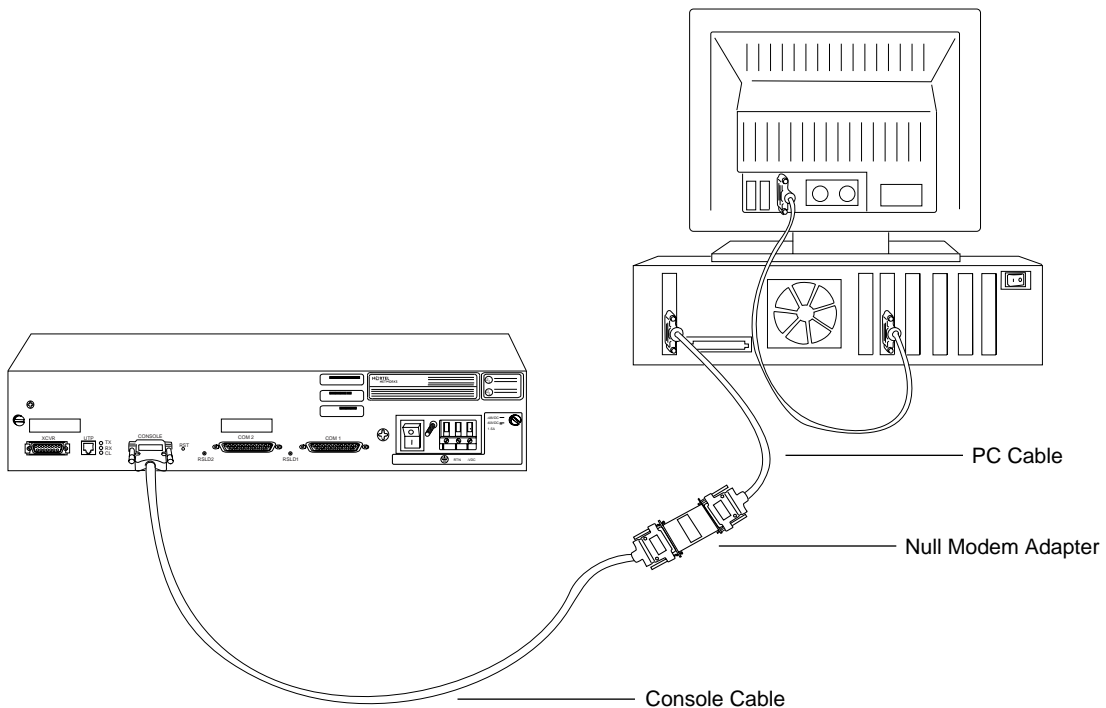
AN0012A

Figure 1-9.   Connecting a PC Console

The PC console is now connected. Proceed to the section "Connecting to the DC Power Source."

Connecting a Modem

A modem provides remote access to the AN/DC for a network administrator. We recommend that you connect a modem in case the AN/DC experiences system problems.

➡️ **Note:** Netboot, Directed Netboot, and Local Boot require a terminal or PC console connection. After the AN/DC is on the network, you can replace the console connection with a modem connection. When using EZ Install, you can connect a modem to the AN/DC before or after you connect the AN/DC to the network.

To connect a modem to the AN/DC, you need

- An AT (or Hayes) compatible modem

- The Order No. 110307 modem cable in the AN/DC console/modem cable kit

Do *not* use the Order No. 110308 null modem adapter from the AN/DC cable kit.

Once you have the appropriate equipment, complete the following steps:

1. **Configure the modem, using the parameters in Table <u>1-2</u>.**

   Refer to the modem user manual for instructions.

Table 1-2.   Modem Parameters

Modem Signal/Parameter	Value
Clear To Send (CTS)	On
Data Terminal Ready (DTR)	Depends on the modem type. Set DTR to require the modem to answer incoming calls.
Data Carrier Detect (DCD) *	On while carrier is present (the AN/DC uses DCD to detect modem connect and disconnect).
Data Set Ready (DSR)	On
Ready to Send (RTS)	Ignore
Synchronous/Asynchronous Mode	Asynchronous
AutoAnswer	Set on *n* rings with DTR active (*n* must be greater than 0).
Local Character Echo	Off

(continued)

Table 1-2.   Modem Parameters *(continued)*

Modem Signal/Parameter	Value
Supervisory Functions	Off
Baud Rate	9600 (or less)
Data Bits	8
Stop Bits	1
Parity	None

 * The DCD signal is also called RLSD.

Caution: Do not connect a modem to the AN/DC until you are certain that it is configured as described in Table 1-2. Connecting to the AN/DC with an improperly configured modem could cause the router to fail or lose data.

2. **Power off the modem.**

3. **Insert the 9-pin receptacle end of the modem cable into the back-panel CONSOLE port of the AN/DC (Figure 1-10).**
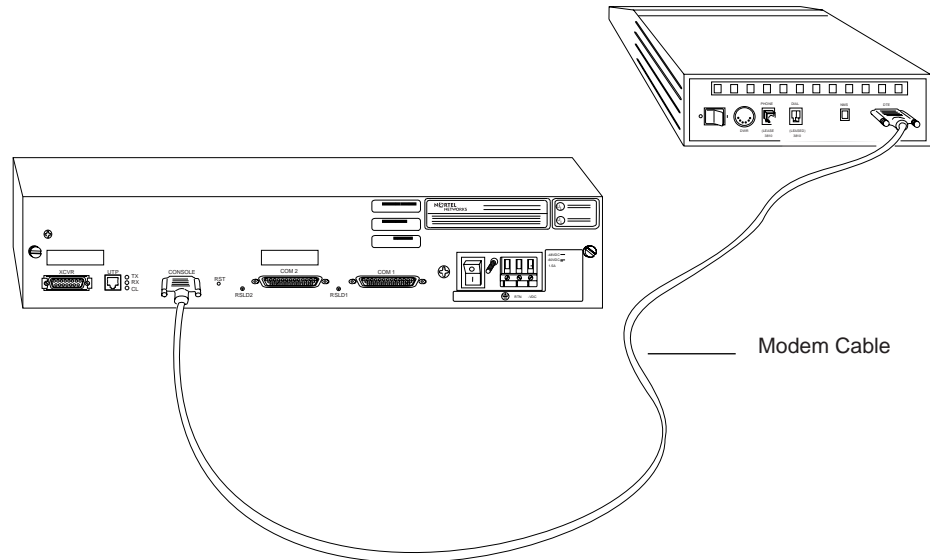
AN0013A

Figure 1-10.   Connecting a Modem

   4. **Insert the 25-pin plug at the other end of the modem cable into the
       modem's RS-232 data communications port.**

The modem is now connected to the AN/DC.

Next, connect the power source as described in the following section.

Connecting to the DC Power Source

⚠ **Danger:** Due to high-energy hazards, only qualified service personnel are
permitted to connect the AN/DC to the power source.

To connect the AN/DC to the power source:

   1. **Ensure that the power switch is in the OFF (0) position (Figure 1-11).**

   2. **Using a flathead screwdriver, loosen, but do not remove, the screws
       beneath the terminal blocks marked -VDC and RTN (Figure 1-11).**
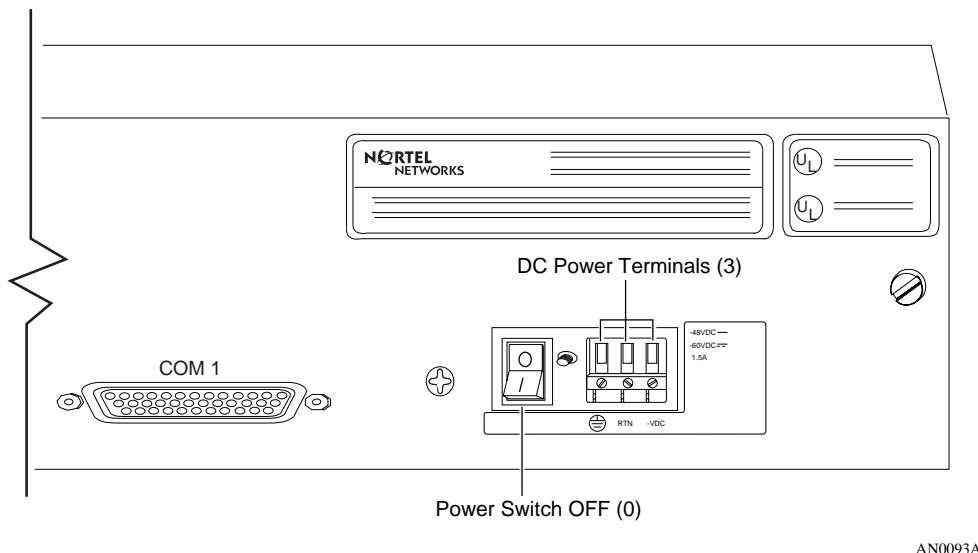
AN0093A

Figure 1-11.   AN/DC Power Switch and DC Terminals

3. **Strip 3/8 in. (10 mm) of insulation from the end of a #16 or #18 AWG cable.**

→ **Note:** Although #18 AWG cable is adequate, we recommend #16 AWG cable to ensure minimal voltage drop from the power source.

4. **Insert the stripped end of the cable into the -VDC terminal block, the minus lead (Figure 1-12).**

5. **Tighten the screw beneath the -VDC terminal block to establish the electrical connection.**
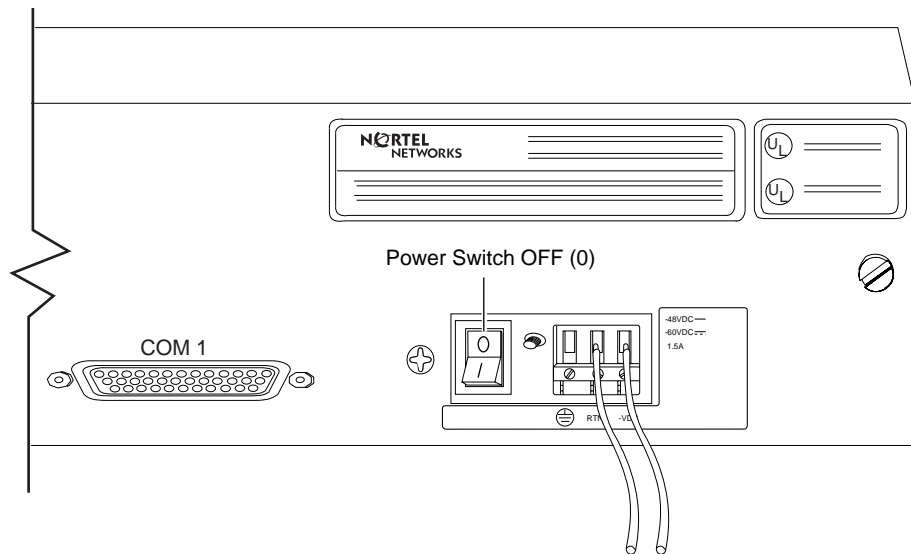
AN0091B

Figure 1-12.   Attaching AN/DC Power Input Cables

6. **Strip 3/8 in. (10 mm) of insulation from a #16 or #18 AWG cable.**

   Make certain to use the same wire gauge as that used for the minus lead.

7. **Insert the stripped end of the cable into the RTN terminal block, the plus lead (Figure 1-12).**

8. **Tighten the screw beneath the RTN terminal block to establish the electrical connection.**

9. **Connect an earth ground to either the leftmost terminal block or to the grounding stud, located between the power switch and terminal connectors (Figure 1-13).**

   If connecting to the grounding stud, use a #6 ring terminal.

➡️ **Note:** Use the same wire gauge (or greater) for the earth ground as that used for connection to the power source. That is, if connection to the power source uses #16 AWG cable, use #16 AWG cable for the ground. If connection to the power source uses #18 AWG cable, use #18 or #16 AWG cable for the ground.

COM 1

−48VDC
−60VDC
1.5A

RTN   −V

Earth ground options
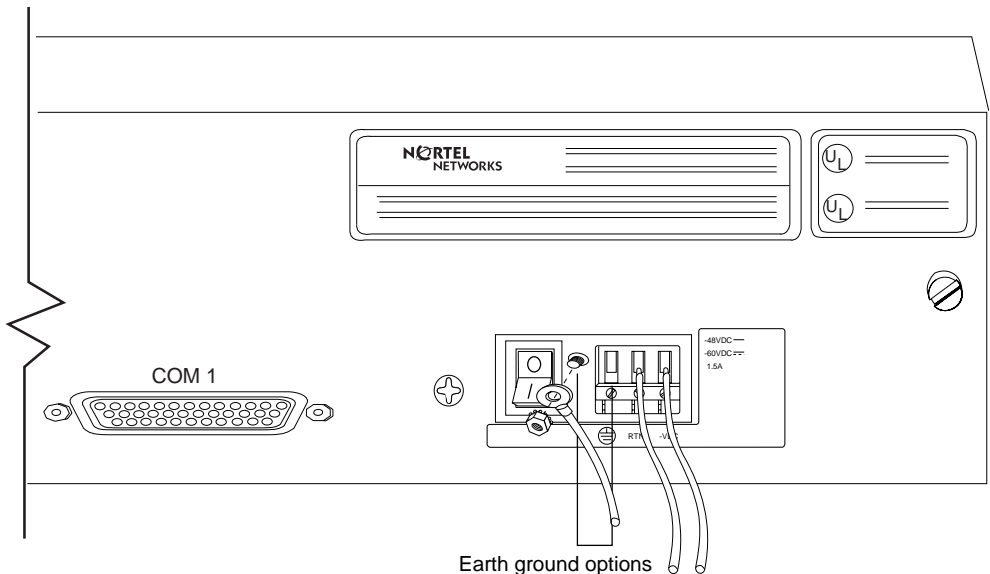
AN0092A

Figure 1-13.   Attaching AN/DC Power and Ground Cables

10. **Before qualified service personnel connect the AN/DC to the power source, verify that the power switch is OFF and that the AN/DC is properly grounded.**

⚡ **Danger:** Once the AN/DC is connected to the power source, do not remove the input wires. You must disconnect from the power source before removing the AN/DC power input wires.

Chapter 2
Installing the ANH-8/DC

This chapter describes how to install the ANH-8/DC.

> ⚠ **Danger:** Due to high-energy hazards, only qualified service personnel are permitted to install the ANH-8/DC.

Topics in this chapter include:

- Preparing for Installation
- Installing the ANH-8/DC
- Connecting Communications Cables
- Connecting a Management Console or Modem
- Connecting to the DC Power Source

For information on how to install the AN/DC, see Chapter 1. For technical specifications and an overview of the ANH-8/DC hardware, refer to Appendix C.

Preparing for Installation

To prepare for installation, complete the steps in the next sections to verify that:

- Your shipment is complete and undamaged.
- You have the proper equipment and tools.
- The installation location meets all site requirements.

Verifying Shipment Contents

Verify that the items you receive match the items in the packing list attached to the shipping container.

1. **Inspect all items for shipping damage.**

   If you detect any damage, do not install the ANH-8/DC. Call the Nortel Networks Technical Response Center.

2. **Verify that the items you received match the items in the packing list.**

   The packing list is usually affixed to the shipping container.

3. **Make sure that you received**

   - One **cable kit** (Order No. 110310) for connecting an optional local console or modem. The console/modem cable kit contains one 15-foot AT standard molded serial cable (with DB-9 receptacle to DB-25 plug connectors) and one null modem crossover adapter (with DB-25 to DB-25 receptacle connectors).

   - Two **flange brackets** with four #10 cagenut screws and washers for mounting the ANH-8/DC.

   - Eight #6 Class B self-threading flathead **screws** (for rack-mounting).

   - Four #6 Class B self-threading roundhead **screws** (for wall-mounting).

   - Four press-on rubber **feet** (for positioning the ANH-8/DC on a flat surface).

   Figure 2-1 illustrates the ANH-8/DC shipping accessories.

Console/Modem Cable
(DB-9 Receptacle to
DB-25 Plug Cable

DB-25 Receptacle
Null Modem Adapter

Two Flange Brackets

Eight #6 Flathead Screws

Four #6 Roundhead Screws

Four #10 Cagenut Screws and Washers

Four Rubber Feet
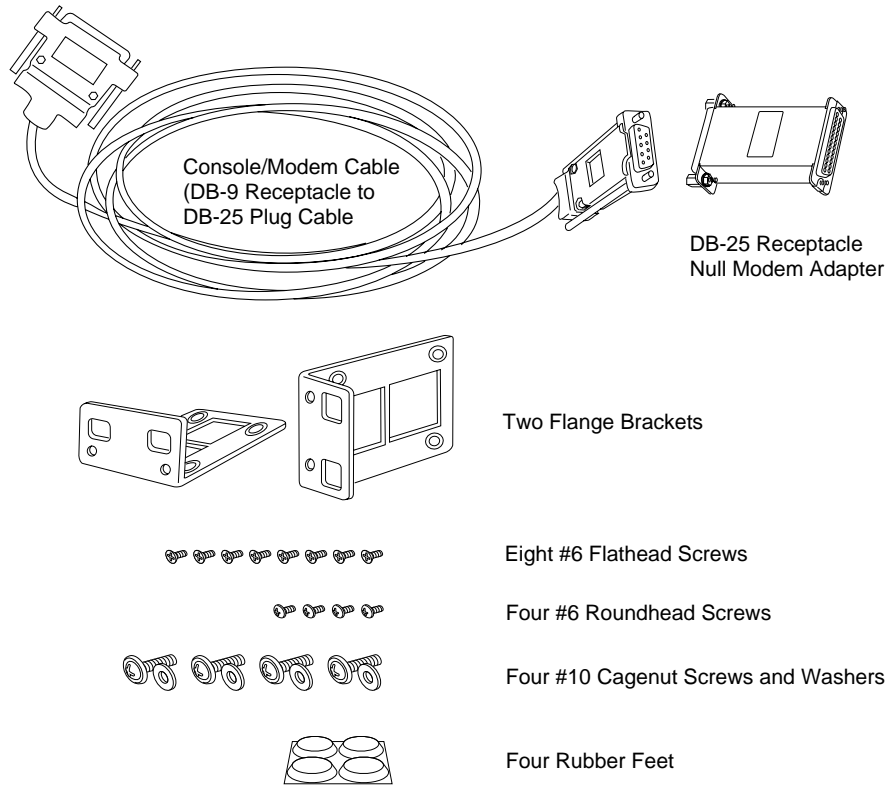
AN0037B

Figure 2-1.   Accessories in the ANH-8/DC Shipping Container

Supplying Tools and Equipment

You may need items that are not part of the ANH-8/DC shipping accessories. Before installing the ANH-8/DC hardware, ensure that you have all the cables, tools, and other equipment that you need at your site.

Tools

Gather the tools that you will need to set up an AN/DC at your site, such as:

•   Phillips screwdriver, for attaching brackets to rack- or wall-mount the AN/DC

•   Flathead screwdriver, for attaching network cables

•   Electric drill, if you intend to mount the AN/DC on a wall

Cables

Unless they were specifically ordered, the Ethernet and synchronous cables necessary for your network configuration are not part of the ANH-8/DC shipping accessories. If you do not have the proper cables, contact your network administrator or see the *Cable Guide for Routers and BNX Platforms.*

Service Console

You can attach an optional VT-100 console or equivalent to the ANH-8/DC to monitor the results of startup diagnostics and perform manual boot configurations; or you can attach any AT-compatible modem to allow remote dial-in access to diagnostics and configuration.

➡️ **Note:** To use the Netboot, Directed Netboot, or Local Boot configuration options (see Chapter 3), there must be a local terminal connected the first time that the ANH-8/DC powers up.

Mounting Hardware

To rack-mount the ANH-8/DC, you need an electronic enclosure rack that meets the following specifications:

• Heavy-duty steel construction

• Electronic Industries Association (EIA) standard hole-spacing

• Width of 19 in. (48.26 cm) and depth of 24 in. (60.96 cm)

If the rack's rails do not have threaded holes, you must supply cagenuts (Figure 2-2) to use with the cagenut screws.
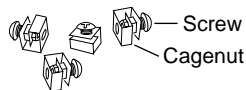
AN0038A

Figure 2-2.   Sample Cagenuts and Screws for Unthreaded Rack Rails

To mount the ANH-8/DC on a wall, you need at least four wall-mount anchor screws (see Figure 2-4).

Verifying Site Requirements

Verify that your installation meet the requirements listed in this section.

- [Space Requirements](#)
- [Electrical Requirements](#)
- [Environmental Requirements](#)

> ➡ **Note:** The AN/DC should be installed only in dedicated equipment rooms where access is limited to qualified service personnel.

Space Requirements

The installation site must provide a certain amount of free space around the ANH-8/DC to dissipate heat. Install the ANH-8/DC in a space that meets these specifications:

- Width: 19.25 in. (48.9 cm)
- Minimum depth: 17.25 in. (43.8 cm)
- Depth for servicing: 26.25 in. (66.7 cm)

Electrical Requirements

The installation site must provide an isolated power source that meets these electrical specifications:

- Input voltage of -48.0 or -60.0 volts DC
- 1.5 amperes (A) input current under full load at -38.0 VDC input
- Reinforced insulation from the main AC power

We recommend the use of #16 AWG cables between the AN/DC and the power source to minimize voltage drop. When measuring the cable run, be certain to include both the input and return cables.

Environmental Requirements

The ANH-8/DC installation site must meet the following environmental specifications:

- Maximum Altitude: 10,000 ft (3000 m)
- Relative Humidity (Operating): 5% to 85%, noncondensing
- Maximum Humidity (Storage): 95%, noncondensing
- Operating Temperature: 41°F to 104°F (5°C to 40°C) stable
- Storage Temperature: -58°F to 113°F (-50° to 45°C)

These requirements meet IEC 721-3 Class 3K3 climatic conditions while under operation and IEC 721-3 Class 1K3 climatic conditions while under storage.

Installing the ANH-8/DC

Once you are ready to install the ANH-8/DC in its final location, proceed with one of the three sections below. You can

- Position the ANH-8/DC on a flat, sturdy, horizontal surface.
- Install the ANH-8/DC in an electronic enclosure rack.
- Mount the ANH-8/DC on a wall.

Positioning the ANH-8/DC on a Flat Surface

To position the ANH-8/DC on a flat surface:

1. **Make sure that the surface is large enough for the ANH-8/DC to operate properly.**

   The surface must be sturdy enough to support the combined weight of the ANH-8/DC and any cables you connect.

2. **Peel the paper backing off the four rubber feet and attach them to the bottom of the ANH-8/DC.**

3. **Set the ANH-8/DC in the chosen location.**

You can now connect the network cables to the ANH-8/DC. Go to the section "Connecting Communications Cables," later in this chapter.

Installing the ANH-8/DC in a Rack

For this procedure, you need

- Four #10 cagenut screws and washers (shipped with the ANH-8/DC)

- Two flange brackets and eight #6 flathead screws (shipped with the ANH-8/DC)

- A Phillips screwdriver

- An electronic enclosure rack

➡ **Note:** If the rack's rail does not have threaded holes, you must supply and attach four cagenuts.

To install the ANH-8/DC in a rack:

1. **Attach a flange bracket to both sides of the ANH-8/DC.**

   On each side of the chassis:

   a. **Align the holes in the longer end of the bracket with the mounting holes near the front of the ANH-8/DC (Figure 2-3).**

   b. **Insert a #6 flathead screw through each hole and into the ANH-8/DC.**

   c. **Tighten the four screws with a Phillips screwdriver.**
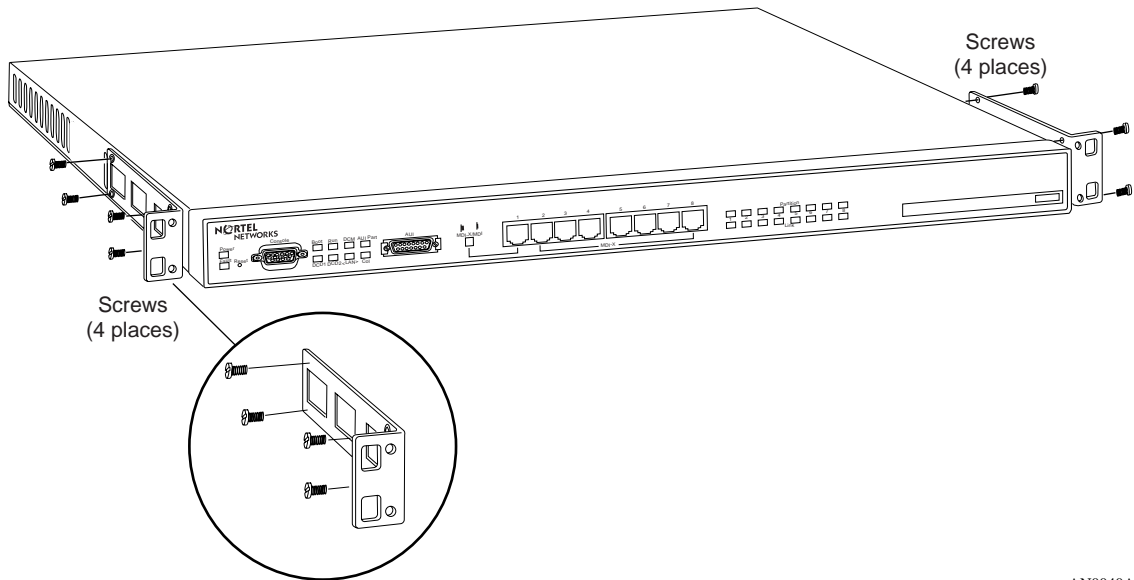
AN0040A

Figure 2-3.   Attaching Flange Brackets to Rack-Mount the ANH-8/DC

2. **Align the flange bracket holes with the holes in the front vertical supports of the rack (Figure 2-4).**
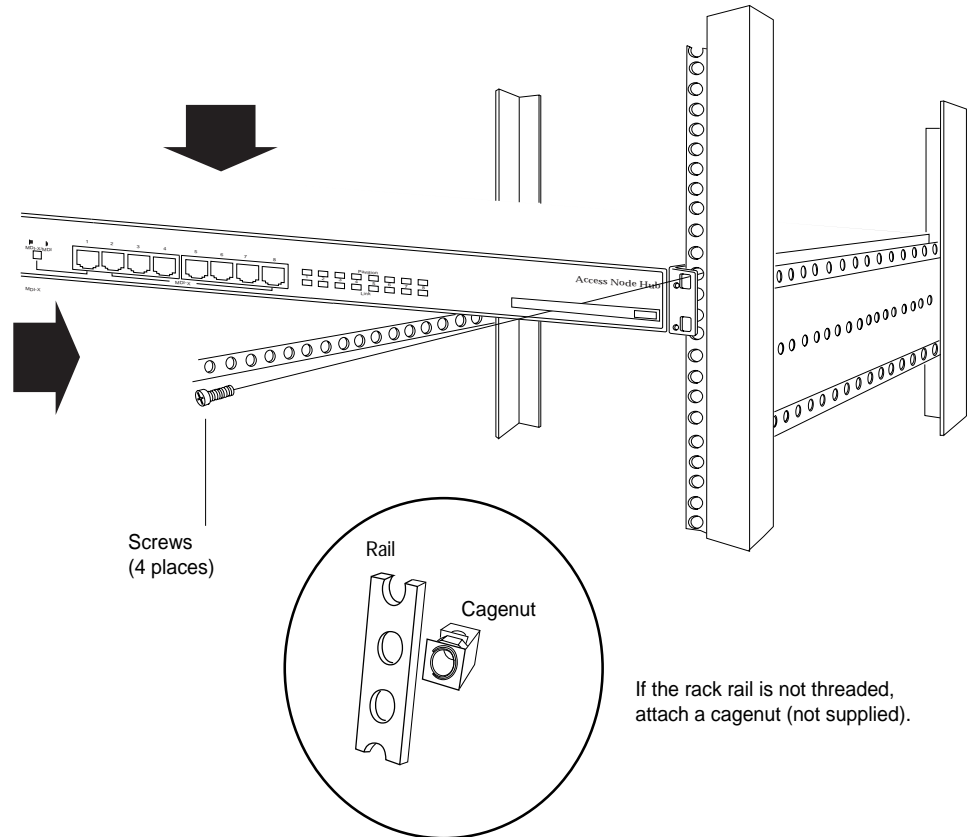
AN0041A

Figure 2-4.   Installing the ANH-8/DC in an Electronic Enclosure Rack

3. **Insert a cagenut screw through each bracket hole and into the corresponding holes in the rack.**

4. **Tighten each cagenut screw with a Phillips screwdriver.**

Mounting the ANH-8/DC on a Wall

For this procedure, you need

- Two flange brackets and four #6 roundhead screws (shipped with the ANH-8/DC)

- Four to eight wall anchor screws (not shipped with the ANH-8/DC)

- A Phillips screwdriver

Complete the following steps:

1. Attach a flange bracket to both sides of the ANH-8/DC.

→ **Note:** The sides of the ANH-8/DC include screw holes at both ends, providing three ways to attach the brackets for wall-mounting. You can attach both brackets toward the front of the ANH-8/DC, both brackets toward the back, or you can offset the two brackets, as shown in Figure 2-5, for the most secure installation.

On each side of the chassis:

a. With the longer bracket piece lying flat, align the holes in the smaller end of the bracket with two of the mounting holes on the side of the ANH-8/DC (Figure 2-5).

b. Insert a screw through each hole and into the ANH-8/DC.

c. Tighten the four screws with a Phillips screwdriver.
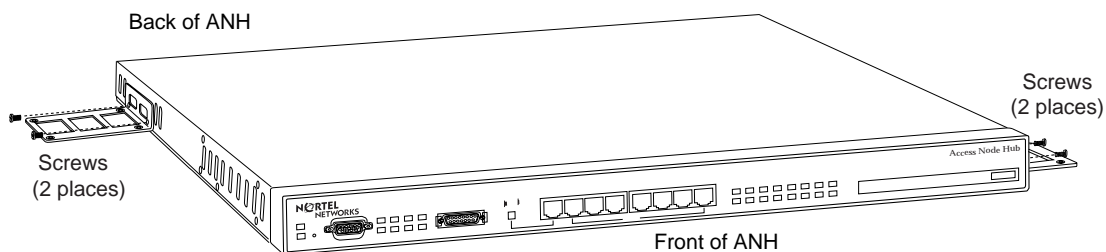
Figure 2-5. Attaching Flange Brackets to Wall-Mount the ANH-8/DC

2. Place the ANH-8/DC with installed brackets against the wall to determine the location of the anchor screws (Figure 2-6).

AN0043A
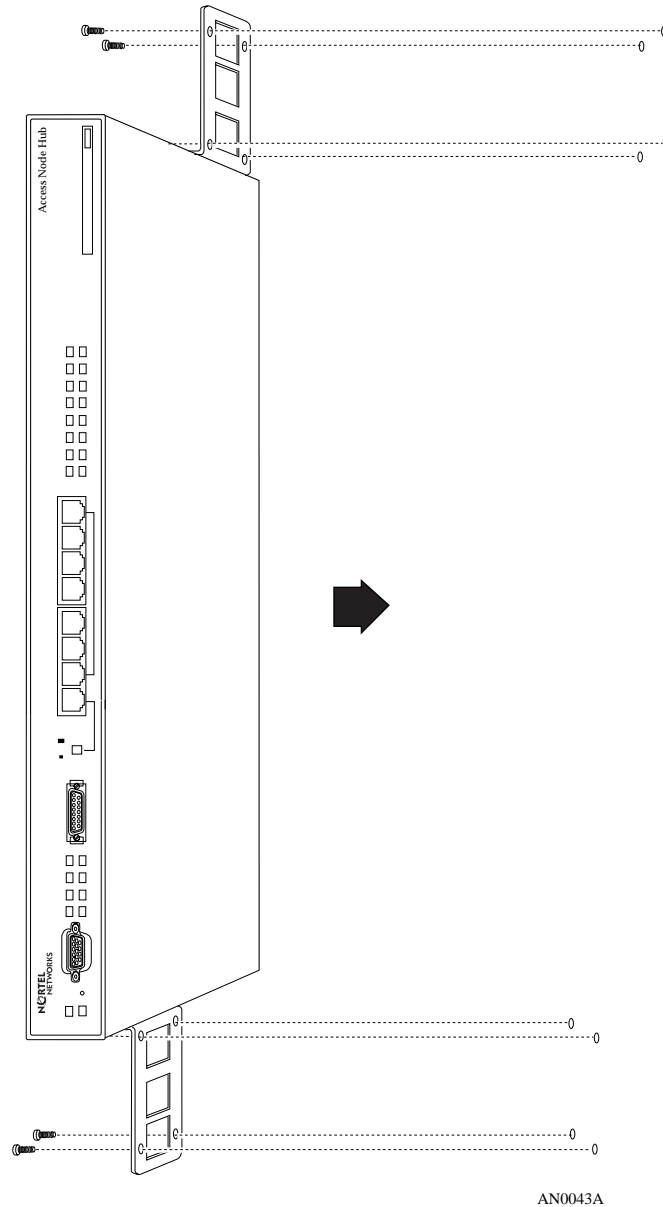
Figure 2-6.   Mounting the ANH-8/DC on a Wall

3. **Insert two to four wall anchor screws thwrough the holes in each flange bracket, and fasten each screw securely in the wall.**

Connecting Communications Cables

Gather the communications equipment and cabling that you will attach to the ANH-8/DC. If you do not have the proper cables, contact your network administrator or see the *Cable Guide for Routers and BNX Platforms*. Appendix C describes the ANH-8/DC cable interfaces.

Connecting an AUI Cable

Complete these steps to connect an Ethernet AUI transceiver cable to the front of the ANH-8/DC:

→ **Note:** Connecting the ANH-8/DC AUI port directly to the AUI port on an Ethernet station violates IEEE 802.3 standards. The AUI port is designed only for connection to a transceiver.

1. **Connect an Ethernet AUI drop cable to the port labeled AUI (Figure 2-7).**

   The cable must have a female 15-pin DSUB connector.
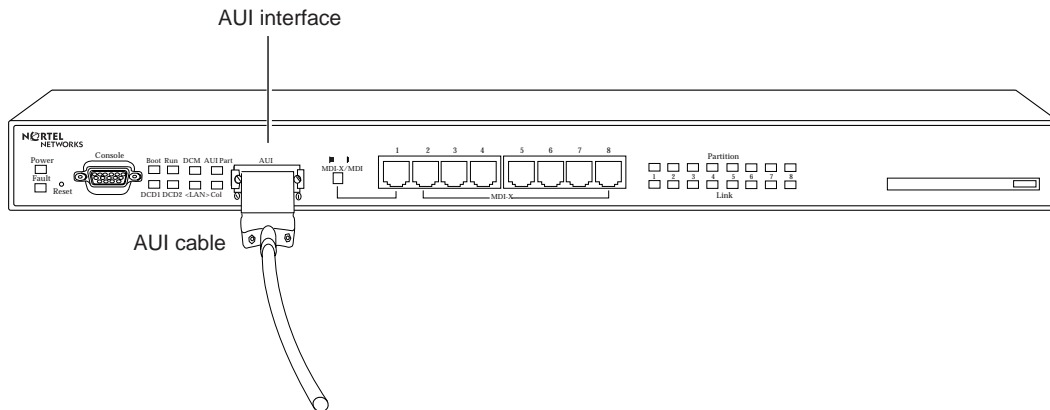
AN0044A

Figure 2-7. **Connecting an AUI Cable**

2. **Secure the AUI cable using the connector slide lock.**

3. **Connect the other end of the cable to the transceiver device.**

Connecting Ethernet Repeater Port UTP Cables

To connect unshielded twisted-pair (UTP) cables to the front panel 10Base-T repeater ports, attach the UTP cables to the front-panel RJ-45 connectors (Ethernet Repeater Ports 1-8), as shown in Figure 2-8.
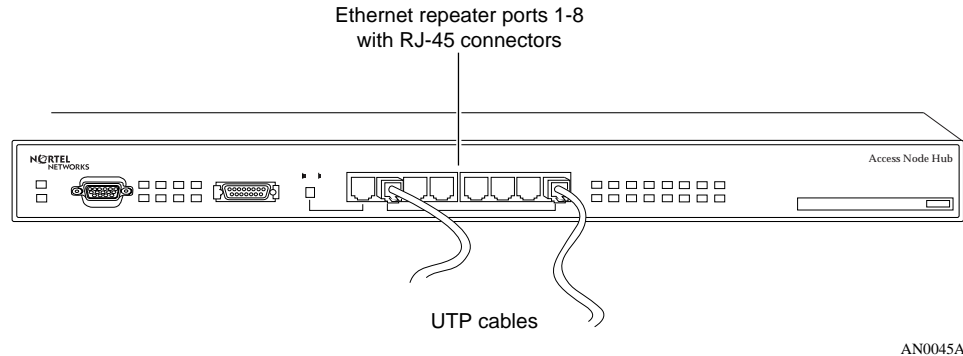
Figure 2-8. **Connecting Repeater UTP Cables**

Using the MDI/MDI-X Switch

The ANH-8/DC front panel includes an external MDI/MDI-X switch (Figure 2-9) that allows you to change transmit and receive signals for 10Base-T repeater Port 1 from normal repeater input mode (*media-dependent interface with crossover*, or *MDI-X*) to repeater cascade out (*media-dependent interface,* or *MDI*) configuration. In MDI-X mode, transmit and receive signal connections are reversed; in MDI mode, the port transmits and receives straight-through signals

With a standard (straight-through) UTP cable in Port 1, press the switch *in* for MDI operation.

With a crossover cable in Port 1, keep the switch *out* for MDI-X operation.
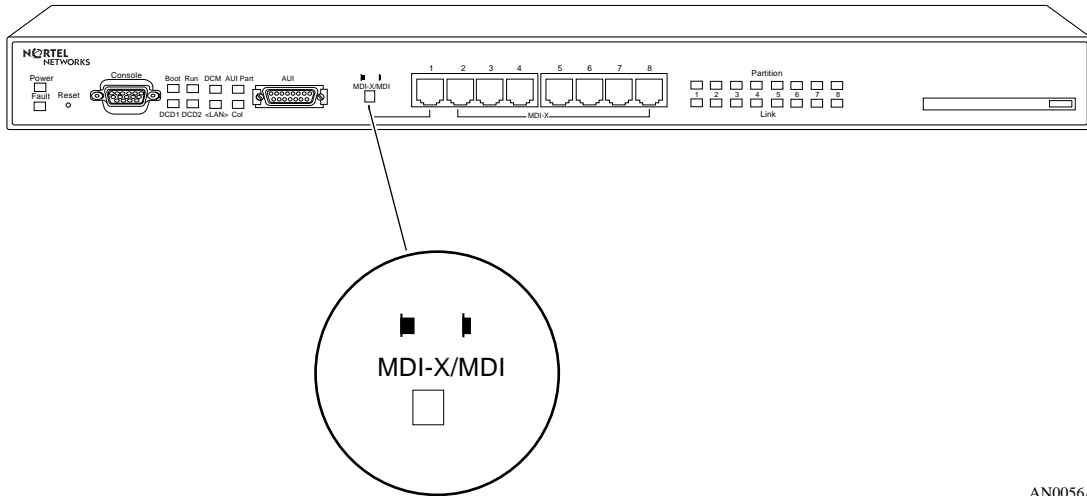
AN0056A

Figure 2-9.   ANH-8/DC Front-Panel MDI-X/MDI Switch

Connecting the ANH-8/DC to Other Repeaters/Hubs

You can use Port 1 in MDI configuration to connect to a 10Base-T MDI-X port on another router/hub/bridge device using UTP straight-through RJ-45 patch cables (instead of a special crossover cable). You can interconnect (daisychain) as many as four 8-Port ANH-8/DC or other hub systems.

To determine whether you need to use a crossover cable or straight-through cable to interconnect hub units, consider the following:

• If the Ethernet UTP ports on both hubs are in MDI mode, use a crossover cable.

• If the UTP ports on both hubs are in MDI-X mode, use a crossover cable.

• If the UTP port on one hub is in MDI mode, and the UTP port on the other hub is in MDI-X mode, use a straight-through cable.

When you configure a network with multiple ANH-8/DC (or other repeater/hub) systems, you must comply with the following rules:

- Connect no more than four hubs.

- Make sure that each UTP connection is not longer than 100 meters (109.4 yards).

- If a transceiver is connected to the AUI port, disable the SQE (signal quality error) test function of the transceiver.

Figure 2-10 shows three ANH-8/DC systems connected with straight-through cables.
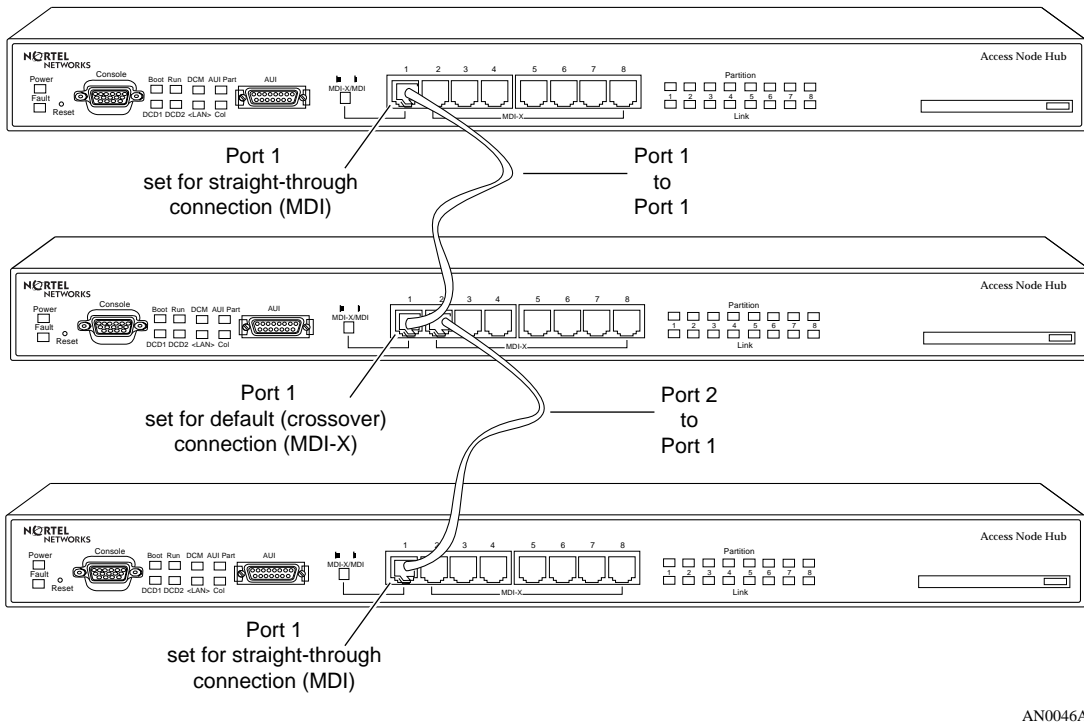
AN0046A

Figure 2-10.   Linking ANH-8/DC Systems

Figure 2-11 shows an ANH-8/DC linked with two other Ethernet hubs. A UTP cable connects each MDI port to an MDI-X port on another hub.
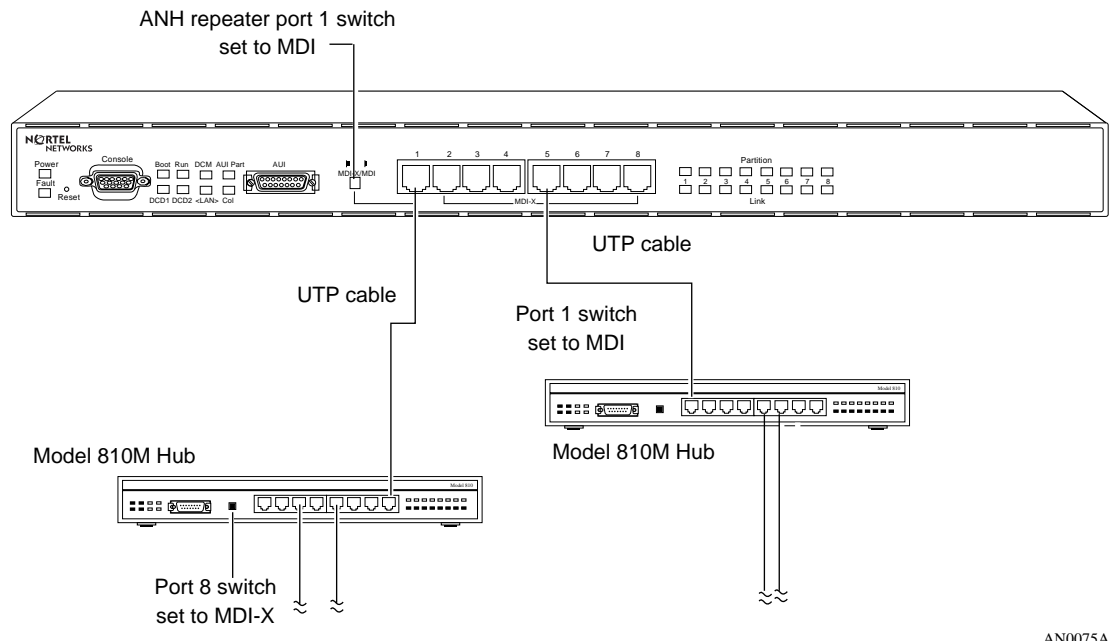
Figure 2-11.   Linking Hubs

Refer to "10Base-T Repeater Ports (ANH-8/DC only)" in Appendix C for more information.

Connecting a Second Ethernet Interface UTP Cable

Complete these steps to connect a UTP cable to the back panel UTP-2 port.

➡ **Note:** This section does not apply unless you have upgraded the ANH-8/DC with a Second Ethernet Interface module.

1. **Attach a UTP cable to the back-panel RJ-45 connector (Figure 2-12).**
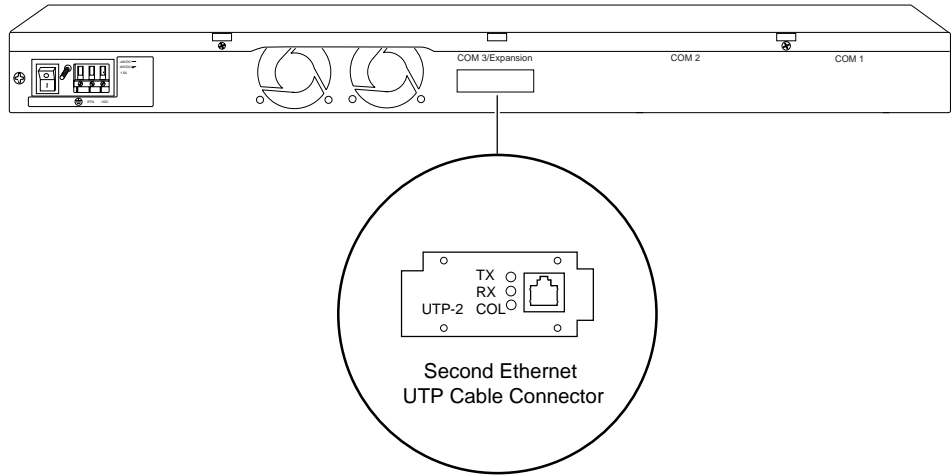
AN0047B

Figure 2-12. Connecting a Second Ethernet Interface Cable

2. **Connect the other end of each cable to the communications device.**

Connecting Synchronous Cables

Connect one to three synchronous interface cables to the back of the ANH-8/DC:

1. **Locate the RS-232, RS-422, V.28, V.35, or X.21 interface cable.**

   See the *Cable Guide for Routers and BNX Platforms*.

2. **Connect the cable to the back-panel port labeled COM1, COM2, or COM3 ([Figure 2-13](#)).**

➡ **Note:** Your ANH-8/DC may not have a third synchronous interface. The COM3/Expansion port may be empty or contain another cable interface.
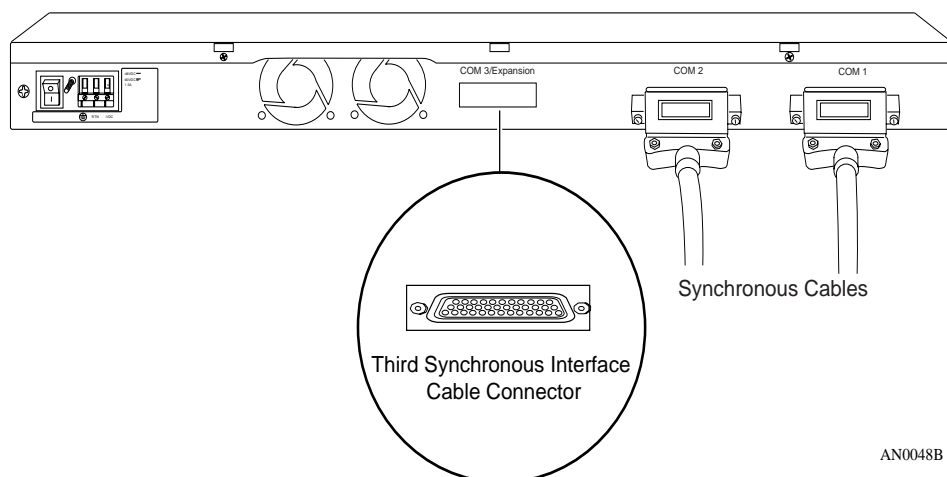
Figure 2-13.   Connecting Synchronous Cables to COM1, COM2, or COM3

➡ **Note:** The orientation of the COM3 connector is reversed from that of the other COM ports.

3. **Secure the screws on the cable's COM connector.**

4. **Connect the remote end of each cable to the appropriate communications equipment.**

Connecting an ISDN Cable

Connect an ISDN BRI cable to the back of the ANH-8/DC:

→ **Note:** This section does not apply unless you have upgraded the ANH-8/DC with an ISDN Basic Rate Interface module.

1. **Plug the ISDN cable into the ISDN-BRI connector (Figure 2-14).**
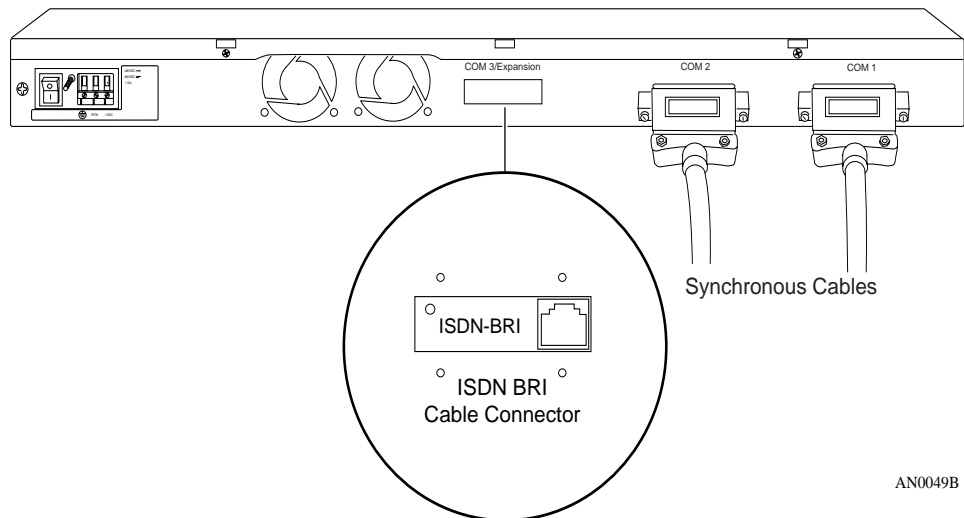
Figure 2-14. **Connecting an ISDN BRI Cable**

2. **Connect the other end of the cable to the ISDN communications device.**

Connecting a Management Console or Modem

Use the front-panel console port to connect an ASCII-based terminal, a personal computer terminal emulator, or a modem to the ANH-8/DC.

Using a local terminal, you can monitor the results of startup diagnostics and set the boot configuration. Using an attached modem, you can allow remote dial-in access to diagnostics.

➡ **Note:** To use the Netboot, Directed Netboot, or Local Boot software configuration options, you must connect a console the first time you power up the ANH-8/DC, as described in Chapter 3.

Connecting a Terminal Console

You need both pieces in the ANH-8/DC console/modem cable kit (Order No. 110310) to connect a console:

• Order No. 110307 serial console/modem cable (with 9-pin receptacle to 25-pin plug connectors)

• Order No. 110308 null modem crossover adapter (with two 25-pin receptacle connectors)

Once you have the appropriate equipment, complete the following steps:

1. **Power on and configure the console, using the parameters in Table 2-1.**

   Refer to the console user manual for instructions.

Table 2-1.   Console Parameters

Parameter	Value
Baud Rate	9600
Data Bits	8
Stop Bits	1
Parity	None

2. **Power off the console.**

3. **Attach the null modem crossover adapter to the 25-pin cable connector.**

4.   **Insert the screw on the cable's connector into the receptacle on the adapter's connector and tighten the screw (Figure 2-15).**

Console cable connector   Null modem crossover adapter

Rotate to tighten screw   Screw receptacle

AN0010A
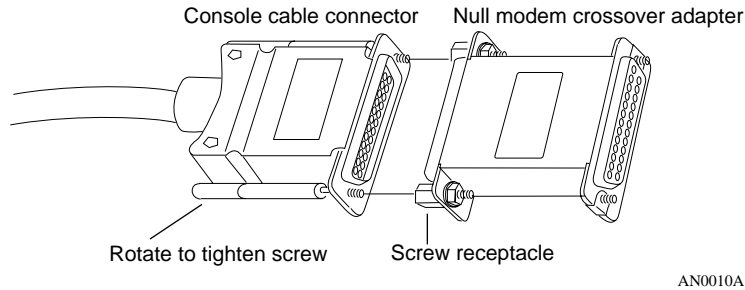
Figure 2-15.   Attaching the Null Modem Adapter

5.   **Attach the 25-pin receptacle connector on the combined cable and adapter to the console's host connector (Figure 2-16).**

Console cable plus
null modem adapter

AN0050A
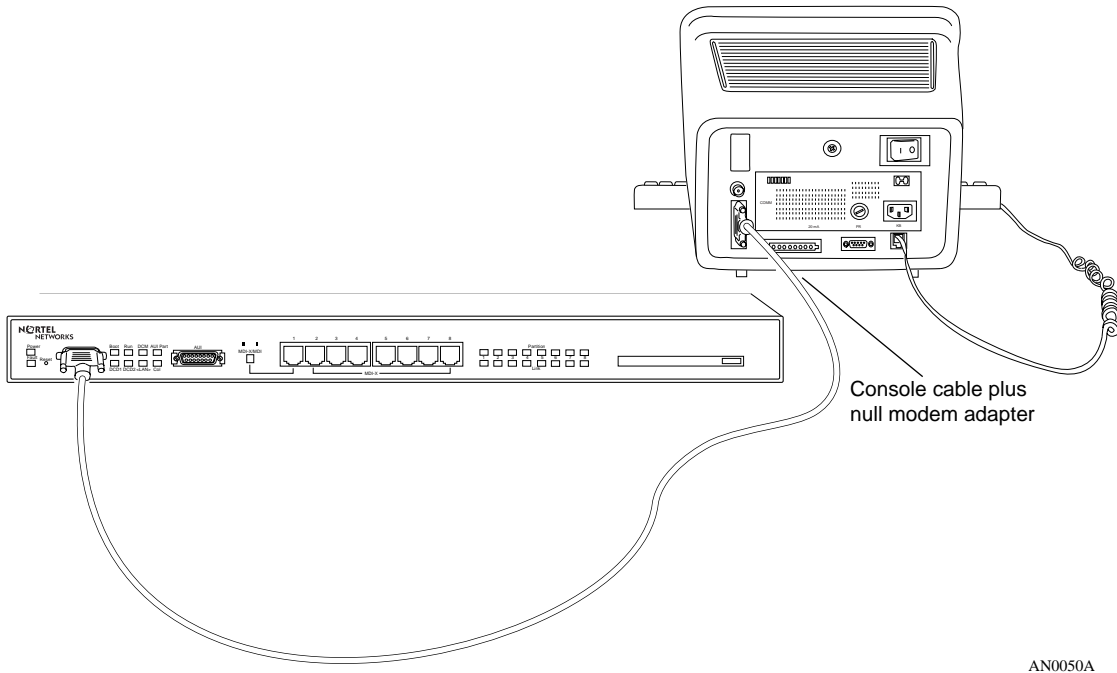
Figure 2-16.   Connecting a Terminal Console to the ANH-8/DC

6. **Insert the 9-pin receptacle end of the console cable into the ANH-8/DC console port connector.**

The console is now connected to the ANH-8/DC.

Connecting a PC Console

You need both pieces in the ANH-8/DC console/modem cable kit to connect a PC:

- Order No. 110307 serial console/modem cable (with 9-pin receptacle to 25-pin plug connectors)

- Order No. 110308 null modem crossover adapter (with two 25-pin receptacle connectors)

You also need another standard AT serial cable with a 25-pin plug connector.

Once you have the correct equipment, complete the following steps:

1. **Power on and configure the console, using the parameters in Table 2-1 and instructions in the console user manual.**

2. **Power off the console.**

3. **Insert the 9-pin receptacle end of the console cable into the front-panel console port (Figure 2-17).**

4. **Attach the null modem crossover adapter to the other end of the console cable (refer to Figure 2-15).**
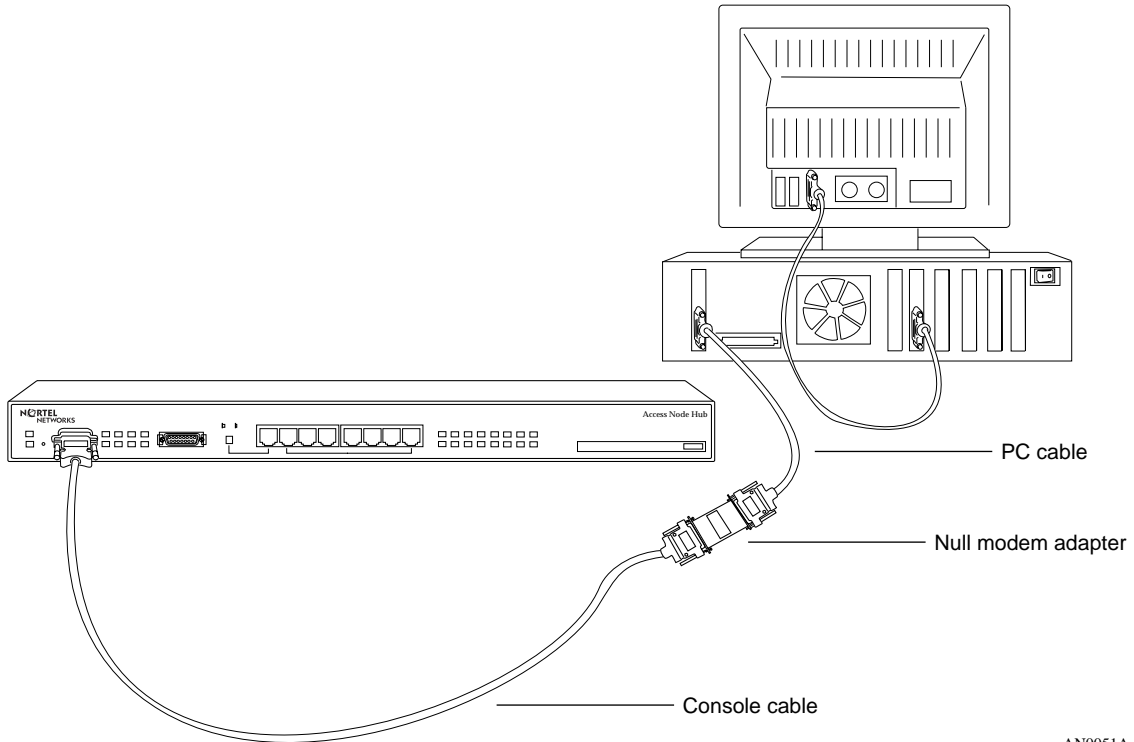
Figure 2-17.   Connecting a PC Console to the ANH-8/DC

> **5. Attach the 25-pin receptacle end of the cable-plus-adapter to the PC console cable's 25-pin plug connector.**
>
> **6. Connect the complete cable unit to the communications port at the back of the PC (Figure 2-17).**

Connecting a Modem

A modem provides remote access to the ANH-8/DC for a system administrator. We recommend that you connect a modem in case the ANH-8/DC experiences system problems.

To connect a modem to the ANH-8/DC, you need an AT (or Hayes) compatible modem and the Order No. 110307 modem cable that came in the ANH-8/DC console/modem cable kit. Do *not* use the Order No. 110308 null modem crossover adapter in the ANH-8/DC cable kit.

Complete the following steps:

1. **Configure the modem, using the parameters in Table 2-2.**

   Refer to the modem user manual for instructions.

Table 2-2.   Modem Parameters

Modem Signal/Parameter	Value
Clear To Send (CTS)	On
Data Terminal Ready (DTR)	Depends on the modem type. Set DTR to require the modem to answer incoming calls.
Data Carrier Detect (DCD) or RLSD	On while carrier is present (the ANH-8/DC uses DCD to detect modem connect and disconnect).
Data Set Ready (DSR)	On
Ready to Send (RTS)	Ignore
Synchronous/Asynchronous Mode	Asynchronous
AutoAnswer	Set on *n* rings with DTR active (*n* must be greater than 0).
Local Character Echo	Off
Supervisory Functions	Off
Baud Rate	9600 (or less)
Data Bits	8
Stop Bits	1
Parity	None

2. **Power off the modem.**

3. **Insert the 9-pin receptacle end of the modem cable into the front-panel console port (Figure 2-18).**

⊖ **Caution:** Do not connect the modem to the ANH-8/DC until you are certain that it is configured as described in Table 2-2 (Step 1). Connecting to the ANH-8/DC with an improperly configured modem could cause the router to fail or lose data.
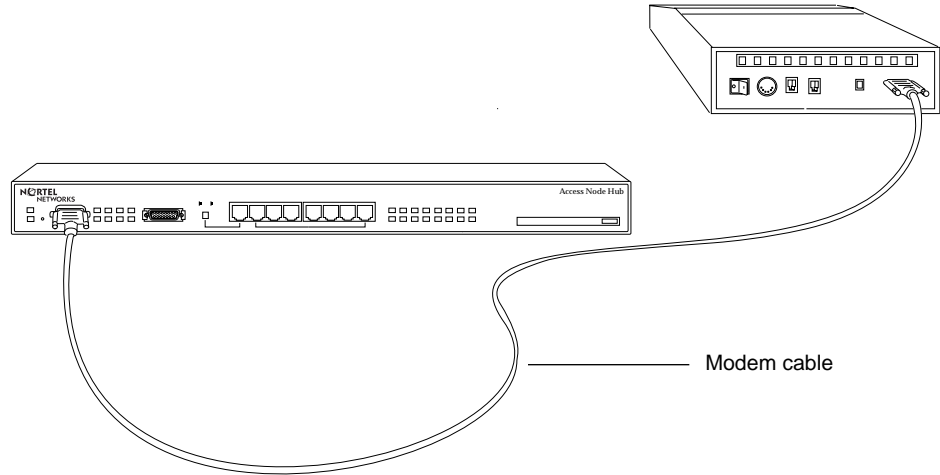
AN0052A

Figure 2-18. **Connecting a Modem to the ANH-8/DC**

4. Insert the 25-pin plug at the other end of the modem cable into the modem's RS-232 data communications port.

Connecting to the DC Power Source

⚠ **Danger:** Due to high-energy hazards, only qualified service personnel are permitted to connect the ANH-8/DC to the power source. Ensure that the connection is to an isolated -48 V or -60 V source (reinforced insulation from the main [AC] power).

To connect the ANH-8/DC to the power source:

1. **Ensure that the power switch is in the OFF (0) position (Figure 2-19).**

2. **Using a flathead screwdriver, loosen, but do not remove, the screws on the terminal blocks marked -VDC and RTN (Figure 2-19).**
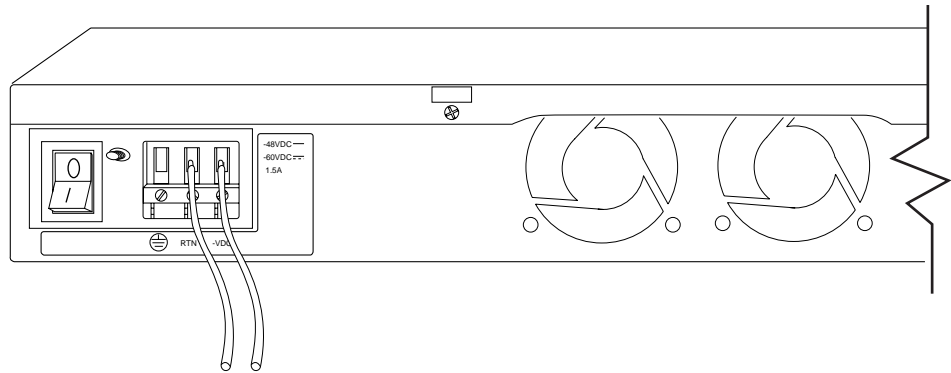
AN0090A

Figure 2-19.   ANH-8/DC Power Switch and DC Terminals

3. **Strip 3/8 in. (10 mm) of insulation from the end of a #16 or #18 AWG cable.**

→ **Note:** Although #18 AWG cable is adequate, we recommend #16 AWG cable to ensure minimal voltage drop from the power source.

4. **Insert the stripped end of the cable into the -VDC terminal block, the minus lead (Figure 2-20).**

5. **Tighten the screw beneath the -VDC terminal block to establish the electrical connection.**

DC power terminals (3)

-48VDC
-60VDC
1.5A

RTN   -VDC

Power switch OFF (0)

AN0094A
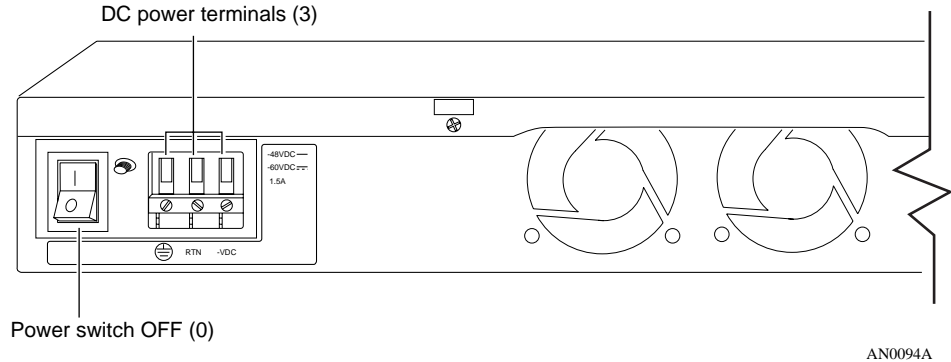
Figure 2-20.   Attaching the ANH-8/DC Power Input Cables

6. **Strip 3/8 in. (10 mm) of insulation from the end of a #16 or #18 AWG cable.**

→ **Note:** Make certain to use the same wire gauge as that used for the minus lead.

7. **Insert the stripped end of the cable into the RTN terminal block, the plus lead (Figure 2-20).**

8. **Tighten the screw beneath the RTN terminal block to establish the electrical connection.**

9. **Connect an earth ground wire to either the leftmost terminal block, or to the grounding stud located between the power switch and the power module connector (Figure 2-21).**

   We recommend using the same wire gauge (or greater) for the earth ground as that used for connection to the power source. That is, if connection to the power source uses #16 AWG cable, use #16 AWG cable for the ground. If connection to the power source uses #18 AWG cable, use #18 or #16 AWG cable for the ground.

   Use a #6 ring terminal when the connecting to the grounding stud.

Earth Ground Options
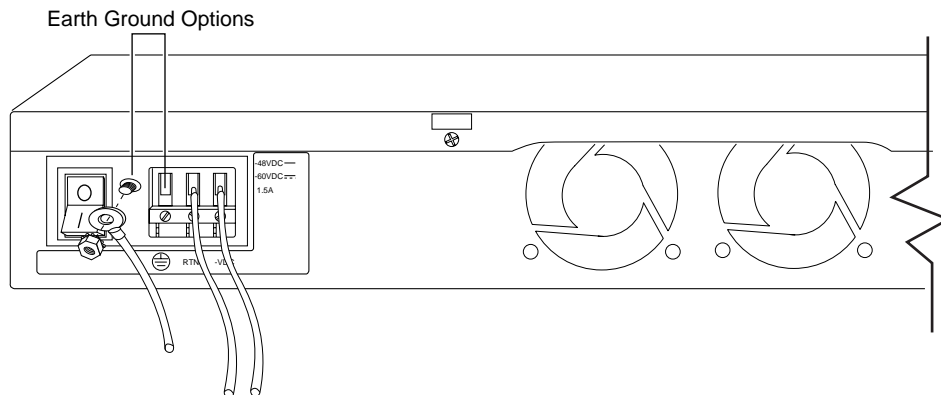
AN0095A

Figure 2-21. Attaching the ANH-8/DC Earth Ground Cable

**10. Before qualified service personnel connect the ANH-8/DC to the power
source, verify that the power switch is OFF and that the ANH-8/DC has
been properly grounded.**

Danger: Once the ANH-8/DC is connected to the power source, do not
remove the input wires. You must disconnect from the power source before
removing the ANH-8/DC power input wires.

Chapter 3
Starting the AN/DC and ANH-8/DC

The first time you start the AN/DC or ANH-8/DC, you complete an important software configuration process.

Before you begin the initial startup from a remote site:

1. Coordinate with your network administrator.

   The network administrator, using the manual *Connecting BayStack AN and ANH Systems to a Network* or *Configuring Remote Access*, determines which software configuration option is best for your site and configures the network to support it.

2. Install the PCMCIA Flash card supplied with the router.

   See "Installing the Flash Memory Card" in this chapter.

3. For information about the software configuration methods, read the "About Software Installation" section in this chapter.

4. To begin the startup process, follow the detailed instructions in one of these sections:

   • Using EZ Install

   • Using Netboot, Directed Netboot, or Local Boot

About Software Installation

To bridge and route traffic, the router needs a configuration file that is customized for the network and a software image made up of executable files -- an operating system kernel and application files. Nortel Networks ships these files on PCMCIA Flash media.

You must complete an initial startup procedure to obtain the necessary files and connect the AN/DC or ANH-8/DC to the network. Getting a file over the network is called network booting, or *netbooting*. Getting a file from the router file system, stored in Flash memory, is called *local booting*.

> **Note:** This guide explains using Site Manager software to connect the router to a managed network. If you plan to use EZ Internetwork software to start the AN/DC or ANH-8/DC on the network, you use the Quick2Config software. Quick2Config is a Microsoft Windows-based application that allows you to quickly and easily create or modify configuration files for Nortel Networks Access routers. See *Configuring Your Router Using the Quick2Config Tool* for information.

Boot Options

You use one of four Site Manager boot options to complete software installation: EZ Install, Netboot, Directed Netboot, or Local Boot. Table 3-1 summarizes the four options; the sections that follow provide steps for completing each option.

Table 3-1.   Summary of Initial Startup Options

Boot Option	Source for Router Image	Source for Config File	Description and Requirements
EZ Install	Local (Flash memory card)	Network (synchronous connection)	The default option. The router boots from local Flash memory, then obtains its configuration file from a remote UNIX- or DOS-based workstation that is configured as a Boot Protocol (BootP) server. The router saves the configuration to Flash memory. Requires a High-level Data Link Control (HDLC) or Frame Relay synchronous connection.
Netboot	Local (Flash memory card) or Network (synchronous or Ethernet connection)	Network (synchronous or Ethernet connection)	The router locates and obtains startup files from a remote UNIX- or DOS-based station that is configured as a BootP server. Requires a communications connection over an HDLC, Frame Relay, or Ethernet interface, and a local console connection.

(continued)

Table 3-1. **Summary of Initial Startup Options** *(continued)*

Boot Option	Source for Router Image	Source for Config File	Description and Requirements
Directed Netboot	Network (synchronous or Ethernet connection)	Network (synchronous or Ethernet connection)	The router obtains all startup files from a remote UNIX- or DOS-based workstation that is configured as a Trivial File Transfer Protocol (TFTP) server. You specify the IP address of the TFTP server and the pathname of the startup files before booting. Requires a communications connection over an HDLC, Frame Relay, or Ethernet interface, and a local console connection.
Local Boot	Local	Local	The router boots from a local software image and generic startup configuration file. You create a customized configuration file by running an installation script. Requires a local console connection.

Installing the Flash Memory Card

A PCMCIA Flash memory card (Figure 3-1) provides storage capability for the nonvolatile file system (NVFS) in the AN/DC and ANH-8/DC. When you remove a formatted memory card, the NVFS automatically removes access to the card. When you insert and format a card or insert an already formatted card, the NVFS automatically provides access.
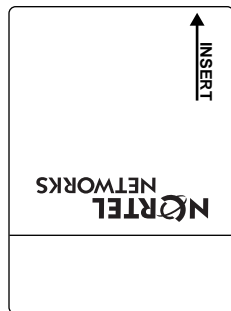
AN0060A

Figure 3-1. **Flash Memory Card**

Before starting the router, install the Flash memory card supplied with the router by following these steps:

1. **Position the card with the label facing up and the INSERT arrow pointing toward the card receptacle.**

2. **Insert the card into the receptacle.**

    Figure 3-2 shows how to insert the Flash memory card in an AN/DC that does not have a Flash memory card protector installed.

    Figure 3-3 shows how to insert the card in an ANH-8/DC.

3. **Gently push the card until it fits snugly into place.**

If the card is new, and you did not obtain it from Nortel Networks, you must format the card before attempting to write to it. You can format the card using Site Manager software or the **format** command available with the Nortel Networks Technician Interface. (Refer to *Using Technician Interface Software* for instructions.)

Caution: If you attempt to boot without the Flash memory card inserted, the router will not operate.
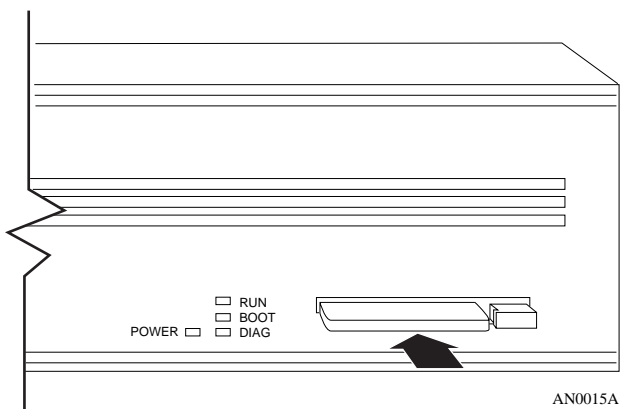
Figure 3-2. **Inserting the Flash Memory Card in the AN/DC Receptacle**

AN0061A
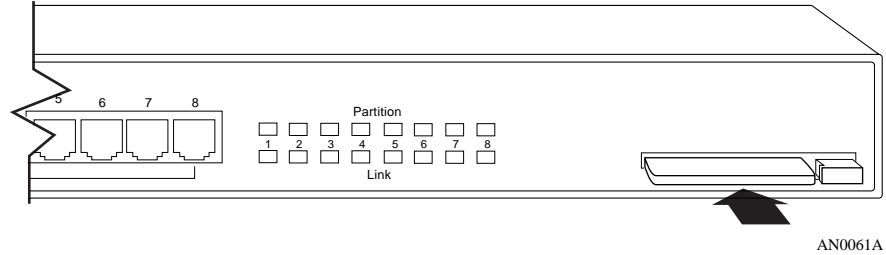
Figure 3-3. **Inserting a Flash Memory Card in the ANH-8/DC Card Receptacle**

Using EZ Install

To use the EZ Install feature:

1. **Install the router and attached communications equipment as described in Chapter 1 (AN/DC) or Chapter 2 (ANH-8/DC).**

   There must be at least one synchronous connection to one of the COM ports.

   Although you do not need a modem or console connection for EZ Install, we strongly recommend that you connect a modem or console. This lets you issue commands to the router and view messages.

2. **Contact your network administrator to verify that the remote network is set up so that you can start the EZ Install procedure.**

3. **Be sure that the Flash memory card is installed, as described earlier in this chapter.**

4. **Supply power as described in this chapter.**

   As the router powers on, it begins diagnostic tests. Your console displays the message `*****Testing Memory*****` with the amount of memory available.

   Once it passes diagnostic tests, the router automatically activates and completes EZ Install. (It gets a software image from the local file system, its IP address from the upstream router, and a configuration file from the BootP server.) The router then starts bridging and routing traffic.

   When booting, the AN/DC and ANH-8/DC LEDs flash in a particular order. To interpret the LED sequence and troubleshoot any potential problems, refer to Chapter 4.

Using Netboot, Directed Netboot, or Local Boot

You use a command interface to the router software, the Diagnostic Monitor, for Netbooting or Local Booting. (You can also use the Technician Interface or Site Manager for the Directed Netboot procedure.)

The AN/DC and ANH-8/DC ship with the configuration source set to *network* and the image source set to *local*. Using the Diagnostic Monitor, you change the default configuration, bypassing the EZ Install process. The Diagnostic Monitor's **bconfig** command enables you to specify the source for the configuration file and boot image.

Logging In to the Diagnostic Monitor

You begin the Netboot, Directed Netboot, or Local Boot process by logging in to the Diagnostic Monitor. Complete these steps:

1. **Install the router and attached communications equipment as described in Chapter 1 (AN/DC) or Chapter 2 (ANH-8/DC).**

2. **Power on the local management console.**

3. **Insert the Flash memory card as described earlier in this chapter.**

4. **Press the power switch on the back panel to the On position.**

   As the router powers on, your console displays the message `*****Testing Memory*****` with the amount of memory available.

   Next, diagnostic software (AN Diagnostics) begins to test the router. The console displays:

   • The diagnostic software version

   • Information about the hardware (model, revision, and serial numbers)

   • The size of Flash memory and Dynamic Random Access Memory (DRAM)

   • The result of diagnostic tests as each test completes

   Figure 3-4 shows sample output from diagnostic tests.

```
AN Diagnostics: Version - 7.xx - Wed Aug 30 16:29:38 EDT 1996

MOD ID = 0x41A (1050)    Rev = 0x00 (00)    S/N = 0xxxxxxxxx
Flash Card instal                          Memory = xMB

TYPE "?" or "h" for HELP

Test      Description                             Status
TEST 001  SNPROM Checksum Test -------------------- PASSED
TEST 002  DIAG PROM Checksum Test ---------------- PASSED
TEST 003  OS PROM Checksum Test ------------------ PASSED
TEST 004  Memory Alignment Test ------------------ PASSED
TEST 005  Control Register 0 Test ---------------- PASSED
TEST 006  Control Register 1 Test ---------------- PASSED
TEST 007  Control Register 2 Test ---------------- PASSED
TEST 008  Control Register 5 Test ---------------- PASSED
TEST 009  Sts Registers Test --------------------- PASSED
TEST 00A  EEPROM Test (5 msec per byte write)------ BYPASS
TEST 00B  Novram Battery Check ------------------- PASSED
.
.
.
```

AN0062A

Figure 3-4.   Running Diagnostics

5. Before diagnostics are complete, simultaneously hold down the control and c keys to bypass the automatic boot process.

Note: Be sure to press Control-c before the diagnostic tests complete. To display the AN Diagnostics login prompt, you must interrupt the power-up sequence before the AN/DC or ANH-8/DC boots.

The AN Diagnostics login prompt appears. Refer to the top half of the screen in .

```
TEST 00E   Sync Port2 Int Loop TX Chain Test ------- PASSED
TEST 00F   Sync Port2 Int Loop RX Chain Test -------

   AN Diagnostics: Version - 6.01 - Mon July 24 07:54:00 EDT 1996

Login:  Manager

   AN Diagnostics: Version - 6.01 - Mon July 24 07:54:00 EDT 1996
MOD ID = 0x40D (1037)    Rev = 01              S/N = 015693
     Flash =  4MB                              Memory =  4MB


AN_DIAG>>
```

Control-c
invoked

AN00063A

Figure 3-5.   Logging In to the Diagnostic Monitor

6. **Type the following command at the login prompt and press the Return key:**

    Manager

    Note that you must type **Manager** with an uppercase "M."

    The Diagnostic Monitor command line prompt appears (Figure 3-5). You are now using the Diagnostic Monitor.

7. **To use the Netboot, Directed Netboot, or the Local Boot option, refer to the specific section that describes the procedure you want to use.**

    • Continuing with Netboot

    • Continuing with Directed Netboot

    • Continuing with Local Boot

Continuing with Netboot

1. **Contact your network administrator to verify that the network is set up for the Netboot procedure.**

2. **Ask your network administrator (or refer to Appendix A) for the interface configuration command to use in Step 3. Write the command below for reference.**

   ifconfig _____

3. **Type the appropriate ifconfig command at the Diagnostic Monitor prompt and press the Return key to configure the router's interface to the network.**

   Figure 3-6 shows a sample command.

```
AN_DIAG>> ifconfig xcvr1 192.32.37.125 255.255.255.224
AN_DIAG>>
```

AN0001

Figure 3-6.   Sample Interface Configuration Command

4. **Type the following command and press the Return key to verify the configuration that you specified in Step 3:**

   getcfg

   As Figure 3-7 shows, the **getcfg** command displays the location of the boot image and the network configuration file, as well as the interface configuration that you specified using the **ifconfig** command.

```
AN_DIAG>> getcfg

Boot Options:
        boot image=local
        boot config=network

NetBoot Parameters:
        XCVR1...IP=192.32.37.125, Mask=255.255.255.224
        COM1....EZ-Install
        COM2....EZ-Install
        XCVR2...None

AN_DIAG>>
```

Verify ——————— (pointing to XCVR1 line)

AN0065A

Figure 3-7.   Verifying the Interface Configuration

> **Note:** The location of the image and configuration file is either local or network. Local means that the *an.exe* or *config* file is stored on the router's local file system (Flash memory card). Network means that the *an.exe* or *config* file is stored on a workstation located across the network.

5. **If the configuration information is correct, continue to the next step. Otherwise, reenter the correct ifconfig command. Contact your network administrator if you need assistance.**

6. **Type the following command and press the Return key to run the diagnostic tests to completion and boot the AN:**

   reset

   Or type **boot** and press the Return key to boot the router without running the diagnostic tests.

   Figure 3-8 shows sample output from a **boot** command.

```
AN_DIAG>> boot

 Booting Access Node...
 Starting OS Kernel for network boot...
 Attempting Netboot on XCVR1
 Attempting EZ-Install on COM1, using Wellfleet Pt-to-Pt
 Attempting EZ-Install on COM2, using Wellfleet Pt-to-Pt
 IP interface active on XCVR1, attempting BOOTP
 Received BOOTP response from server 192.32.3.9 on XCVR1
 Retrieving config 'config' from network. done
 Found image '1:an.exe' on local file system...booting
 Image is in compressed format... decompressing

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 All rights reserved.
 Login:
```

AN0018A

Figure 3-8.   Netboot

➡ **Note:** If the router tries to Netboot and cannot find a software image or configuration file, it attempts to Local boot once. If both attempts fail, the AN Diagnostic Monitor Login prompt (AN_DIAG>>) appears on the AN console. In this case, you or your network administrator must troubleshoot the problem.

7.   When you boot the router, its LEDs flash in a particular order.

To interpret the LED sequence and troubleshoot any potential problems, refer to Chapter 4.

After connecting the router to the network, you can replace the local console with a modem connection to enable remote dial-in access.

Continuing with Directed Netboot

Before you can use the Directed Netboot procedure, you must have already used the **ifconfig** command (as described in the previous section) to configure the interface from which you plan to use Directed Netboot.

You can use the Diagnostic Monitor, Technician Interface, or Site Manager to perform Directed Netboot. This guide assumes that you are at the router site and are using the Diagnostic Monitor. To manage the router from a remote site, refer to *Connecting BayStack AN and ANH Systems to a Network.*

To use the Directed Netboot feature:

1. **Contact your network administrator to verify that the remote network is set up for the Directed Netboot procedure.**

2. **Ask your network administrator (or refer to Appendix A) for the appropriate boot configuration (bconfig) commands.**

   Write the commands below for reference.

   bconfig image _____

   bconfig config _____

3. **At the Diagnostic Monitor prompt, enter the appropriate bconfig commands.**

   You must enter one **bconfig** command to specify the location of the software image, and another to specify the location of the configuration file. Figure 3-9 shows sample commands.

```
AN_DIAG>> bconfig image network 192.32.x.x /usr/anstartup/krnl_an.exe
Done.
AN_DIAG>> bconfig config network 192.32.x.x /usr/anstartup/config
Done.
AN_DIAG
```

AN0019A

Figure 3-9.   Specifying the Source for Directed Netboot

4. **Type the following command and press the Return key to verify the configuration that you specified in Step 3 (Figure 3-10):**

   getcfg

```
 Boot Options:
       boot image=network
       boot config=network
       host IP address=192.32.x.x
       image pathname=
            "/usr/anstartup/krnl_an.exe"
       config pathname=
            "/usr/anstartup/config"
 NetBoot Parameters:
       XCVR1...IP=192.32.x.x, Mask=255.255.255.224
       COM1....EZ-Install
       COM2....EZ-Install
       XCVR2...None

 AN_DIAG>>
```

AN0020A

Figure 3-10.   Verifying Directed Netboot Configuration

The Boot Options section displays the following information:

- The IP address of the server where the software image and configuration file reside

- The pathnames of the software image and configuration file

5. **If the configuration information is correct, continue to Step 6. Otherwise, reenter the correct bconfig command. Contact your network administrator if you need assistance.**

6. **Type the following command and press the Return key to run the diagnostic tests to completion and reboot:**

   reset

   Or type **boot** and press the Return key to boot the router without running the diagnostic tests. Figure 3-11 shows sample output during the boot process.

```
 Booting Access Node...

Starting OS kernel for network boot...
Attempting Directed Netboot.
Directed Netboot using active IP interface XCVR1.
Retrieving config 'config' from network.  done
Retrieving image 'krnl_an.exe' from network......done


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All rights reserved.

Login:
```

AN0070A

Figure 3-11.   Directed Netboot

➡️ **Note:** If the router cannot find a software image or configuration file via Directed Netboot, it attempts to Local Boot once. If both attempts fail, the AN Diagnostic Monitor Login prompt (*AN_DIAG>*) appears on the console. In this case, you or your network administrator must troubleshoot the problem.

After the router reboots, it gets a configuration file from a TFTP server and loads the software image from the local file system.

The router starts bridging and routing traffic.

7. When you boot the router, its LEDs flash in a particular order. To interpret the LED sequence and troubleshoot any potential problems, refer to Chapter 4.

After connecting the router to the network, you can replace the console connection with a modem connection to enable remote dial-in access.

Continuing with Local Boot

You need to use both the Diagnostic Monitor and the Technician Interface to local boot the AN. Before starting the Local Boot procedure, ask your network administrator for assistance in completing the Quick-Start worksheets in Appendix B.

To use the Local Boot feature:

1. **Contact your network administrator to verify that the network is set up for the Local Boot procedure.**

2. **At the Diagnostic Monitor prompt, type the following command and press the Return key to configure the router to use its local *config* file:**

   bconfig config local

3. **Type the following command and press the Return key to run the diagnostic tests and boot the AN:**

   reset

   Or type **boot** and press the Return key to boot the AN without running the diagnostic tests.

   Figure 3-12 shows sample output during the local boot process.

```
 Booting Access Node...

Attempting local configuration and boot...
Configuration file '1:config' successfully loaded.

Found image '1:an.exe' on local file system...booting
Image is in compressed format... decompressing


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Login:
```

AN0071A

Figure 3-12.   Local Boot

➡ **Note:** If the router tries to Local Boot and cannot get a software image, it
attempts to Netboot once. If both the Local Boot and Netboot attempts fail, the
AN Diagnostic Monitor Login prompt appears on the console. In this case, you
or your network administrator must troubleshoot the problem.

4.   **When you boot the router, its LEDs flash in a particular order. To
     interpret the LED sequence and troubleshoot any potential problems,
     refer to Chapter 4; then return to Step 5.**

5.   **At the login prompt, enter the following and press the Return key to log
     in to the Technician Interface (Figure 3-13):**

     Manager

     The Technician Interface prompt ([1:1]$) appears after the Technician
     Interface mounts the local file system, as shown in Figure 3-13. The prompt
     indicates the present working directory.

```
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All rights reserved.
Login: Manager

Mounting new volume...
Device label:
Directory: 1:
New Present Working Directory: 1:


        Welcome to the Backbone Technician Interface



[1:1]$
```

AN0024A

Figure 3-13.   Logging In to the Technician Interface and Mounting a Volume

➡️   **Note:** To check the contents of the router's local file system on the installed Flash memory card, type **dir** and press the Return key. The router software image and config file should appear among the files listed.

6.   **Type the following command and press the Return key to begin the Quick-Start procedure:**

   run install.bat

7.   **Using your completed Quick-Start worksheet from Appendix B, enter the appropriate network information as the prompts appear.**

   The router uses this information to configure its interface to the network.

   Refer to Appendix B for sample Quick-Start screen output and for information on using Quick-Start commands.

   After the router creates and tests the configuration, your screen displays a message saying that the Quick-Start installation is complete. Then the router dynamically starts using the configuration information you entered.

8. **When the Technician Interface prompt reappears, type the following command and press the Return key to exit the Technician Interface:**

    logout

    Once the install script completes, the router starts bridging and routing traffic.

➡️ **Note:** If the router tries to Local Boot and cannot get a software image, it attempts to Netboot once. If both the Local Boot and Netboot attempts fail, the AN Diagnostic Monitor Login prompt appears on the console. In this case, you or your network administrator must troubleshoot the problem.

---

9. **When you boot the router, its LEDs flash in a particular order. To interpret the LED sequence and troubleshoot any potential problems, refer to Chapter 4.**

After configuring the router network interface, you can replace the console connection with a modem connection to enable remote dial-in access.

Chapter 4
Operating the AN/DC and ANH-8/DC

This chapter describes

- <u>Ensuring a Successful Installation</u> (using the front-panel LEDs)

- Checking the status of the router using

    -- <u>AN/DC LED Descriptions</u>

    -- <u>ANH-8/DC LED Descriptions</u>

- <u>Powering On and Off</u>

- <u>Resetting the AN/DC or ANH-8/DC</u>

- <u>Removing a Flash Memory Card</u>

- <u>Protecting Memory Card Files</u>

Ensuring a Successful Installation

After connecting the router to the network, you can ensure a successful installation by checking the LEDs on the front panel.

Figure 4-1 shows the front-panel LEDs on an AN/DC.

AN0025A
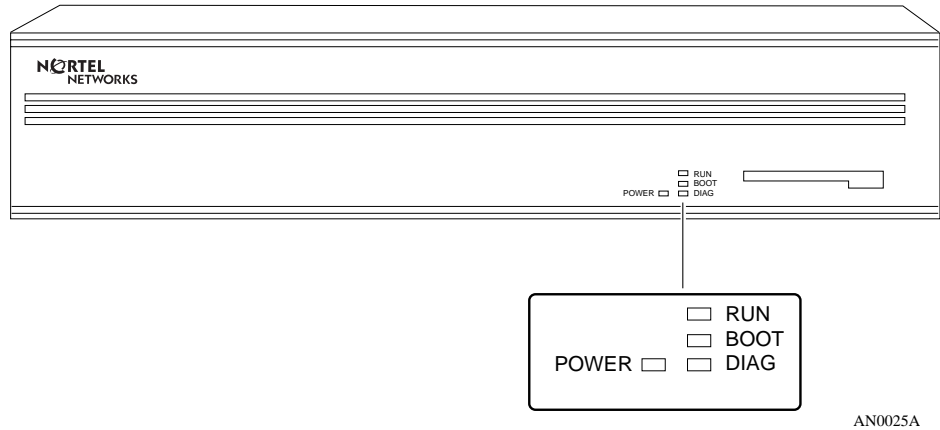
Figure 4-1.   AN/DC Front-Panel LEDs

Figure 4-2 shows the front-panel LEDs on an ANH-8/DC.

AN0058A
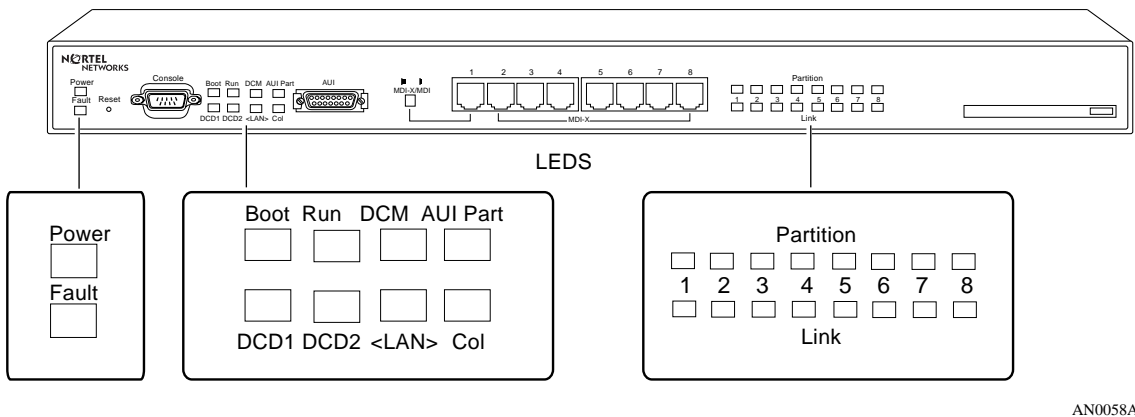
Figure 4-2.   ANH-8/DC Front-Panel LEDs

When power is supplied to the router, the following LED sequence should occur:

- The POWER LED lights and remains on.

- RUN, BOOT, and DIAG (or FAULT for ANH) LEDs light for approximately 1 second, then turn off, indicating that the router is functioning.

- The RUN LED blinks for 1 to 3 minutes, indicating that the diagnostic tests are running. (It blinks quickly during the initial 17-second memory test, then slows down during the interface tests.)

- The BOOT LED lights for 1 to 3 minutes, indicating that the diagnostic tests were successful and the router is booting.

- The RUN LED lights and the BOOT LED turns off, indicating that the router is operational.

If the LEDs on the router light in this sequence, your installation is successful. Contact your network administrator to verify that the router is now connected to the network.

If the LEDs do not light in this sequence, your network administrator can refer to *Connecting BayStack AN and ANH Systems to a Network* to help troubleshoot the problem. If you need additional assistance, contact your local Nortel Networks Technical Response Center.

AN/DC LED Descriptions

LEDs on the AN/DC front and back panels provide information about how the AN/DC is operating. The following sections describe the AN/DC front- and back-panel LEDs. For information on the ANH-8/DC LEDs, see ANH-8/DC LED Descriptions.

Front-Panel LEDs

Table 4-1 describes the AN/DC front-panel LEDs. These LEDs indicate the status of the AN/DC itself. All front-panel LEDs light briefly when the AN/DC first receives power.

Table 4-1.   Front-Panel LEDs

LED	Meaning
POWER	Lights and remains on when the AN/DC is receiving power.
RUN	Blinks for 1 to 3 minutes, indicating that diagnostic tests are running. When it lights again and remains lit, the AN/DC is operational.
BOOT	Lights for 1 to 3 minutes, indicating that diagnostic tests were successful and the AN/DC is booting.
DIAG	Lights and remains lit when diagnostic failure occurs.

Back-Panel LEDs

The LEDs on the AN/DC back-panel differ depending on the AN/DC model that you have. Table 4-2 describes all of the available AN/DC back-panel LEDs. These LEDs indicate the status of the AN/DC's network connections.

Table 4-2.   Back-Panel LEDs

LED	Meaning
Ethernet/Second Ethernet interface (XCVR or UTP)	
TX (Transmit)	Lights when the AN/DC is transmitting data over the network.
RX (Receive)	Lights when the AN/DC is receiving data from the network.
CL (Collision)	Lights when the AN/DC detects a collision on the network.
Synchronous interfaces (COM1 and COM2)	
RLSD1 (Received Line Signal Detection 1)	Lights when Received Line Signal Detection is active on COM 1.
RLSD2 (Received Line Signal Detection 2)	Lights when Received Line Signal Detection is active on COM 2.
ISDN/BRI interfaces	
ISDN BRI	Lights when S/T interface is active; turns off when interface is inactive.

ANH-8/DC LED Descriptions

LEDs on the ANH-8/DC front and back panels provide information about how the ANH-8/DC is operating.

Front-Panel LEDs

Figure 4-2 shown earlier illustrates the three sets of status LEDs on the ANH front panel. Table 4-3 describes the function of each front-panel LED.

➡️ **Note:** All front-panel LEDs light briefly when you turn on the ANH-8/DC; this simply indicates that the ANH-8/DC is receiving power.

Table 4-3.   ANH-8/DC Front-Panel LEDs

LED Label	Color	Meaning
Power	Green	Lights after DC power is delivered to internal circuitry and remains on while the ANH-8/DC is powered on.
Fault	Amber	Lights briefly when the ANH-8/DC is powered on. Remains on if a diagnostic failure occurs. If the Run LED is also on, indicates that the ANH-8/DC is running its self-test.
Boot	Green	Lights for 1 to 3 minutes while the ANH-8/DC is booting to indicate that diagnostic tests were successful after power up.
Run	Green	Flashes for 1 to 3 minutes while diagnostic tests are running; this indicates that the ANH-8/DC has not yet started to execute the run-time image software code. The light remains on to indicate that the ANH-8/DC has begun to execute the software image. If the Fault LED is also on, this indicates that the ANH-8/DC is running its self-test.
DCM	Green	Lights to indicate an RMON data collection module (DCM) is installed.

(continued)

Table 4-3. **ANH-8/DC Front-Panel LEDs** *(continued)*

LED Label	Color	Meaning
AUI Part (Partition)	Amber	Lights to indicate that the AUI port has been partitioned from the repeater due to a disruption in transmission. Autopartitioning occurs after an excessive number of consecutive collisions or an excessively long single-collision signal.
DCD1 (Data Carrier Detect 1)	Green	Lights to indicate that the first synchronous port (COM1) is active.
DCD2 (Data Carrier Detect 2)	Green	Lights to indicate that the second synchronous port (COM2) is active.
<LAN>	Green	Lights after each data transmission to indicate data present in the repeater. The signal is longer than the duration of data, allowing the eye to perceive the occurrence of very short transmissions. The LED may appear to flicker during numerous transmissions.
Col (Collision)	Amber	Lights to indicate a collision in the AUI repeater.

Back-Panel LEDs

Figure 4-3 illustrates the back-panel LEDs for the ISDN and Second Ethernet options. These LEDs are visible after installing either an ISDN BR Interface or Second Ethernet Interface upgrade module.
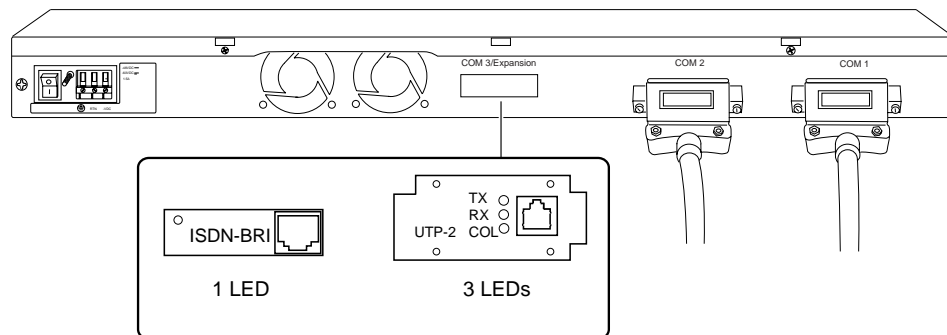
AN0059B

Figure 4-3. **ANH-8/DC Back-Panel LEDs**

Table 4-4 describes the back-panel LEDs.

Table 4-4.   Back-Panel LEDs

LED	Color	Meaning
Ethernet UTP2 interface		
TX (Transmit)	Green	Lights when the ANH-8/DC is transmitting data over the network.
RX (Receive)	Green	Lights when the ANH-8/DC is receiving data from the network.
COL (Collision)	Amber	Lights when the ANH-8/DC detects a collision on the network.
ISDN/BRI interfaces		
ISDN BRI	Green	Lights when S/T interface is active; turns off when interface is inactive.

Powering On and Off

The DC power switch allows you to restart the router without having to disconnect the power supply wires. When the power switch is turned off, the outputs of the power supply shut off, but the front end is still active.

⚠ **Danger:** Once the AN/DC is connected to the power source, the central office must shut off the circuit breaker to remove the wires to the power supply.

To power on an AN/DC or ANH-8/DC:

1. **Press the power switch to the On position (1); that is, toggle the switch down.**

   For the AN/DC, see Figure 4-4. For the ANH-8/DC, see Figure 4-5.

➡ **Note:** If the AN/DC or ANH-8/DC does not power on, check the polarity of the connections to the power source. If polarity has been reversed, the router will not power on. If polarity is correct and the AN/DC or ANH-8/DC does not power on, contact the Nortel Networks Technical Response Center.
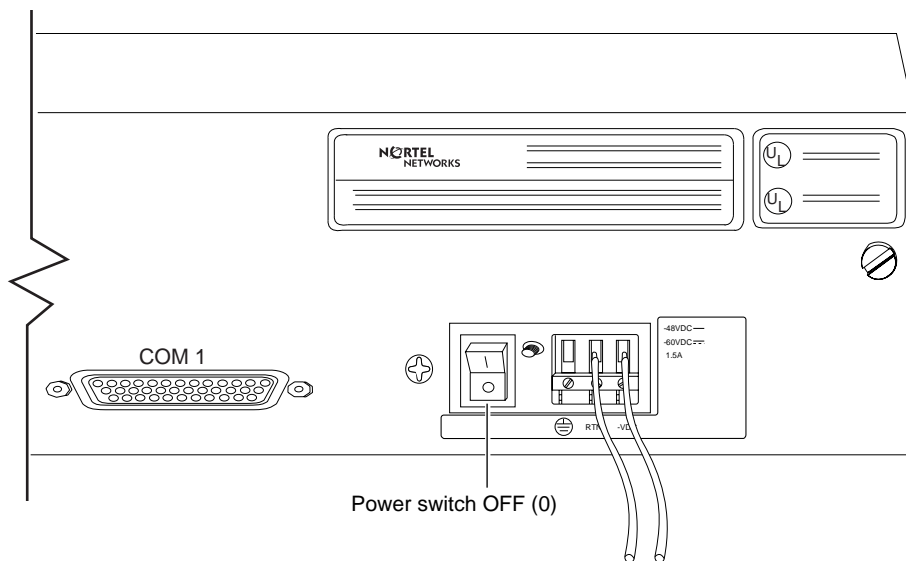
AN0091A

Figure 4-4.   AN/DC Power Switch
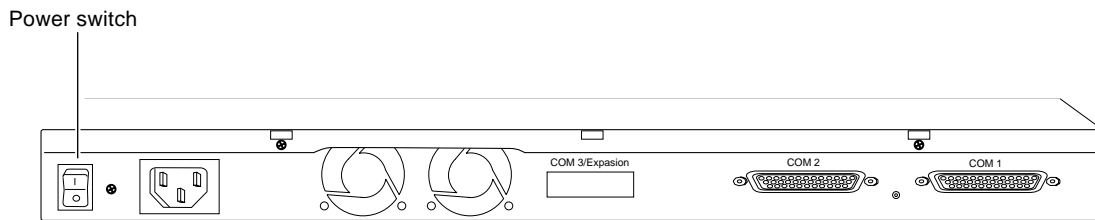
AN0054A

Figure 4-5.   ANH-8/DC Power Switch

2.   Verify that air is flowing by placing your hand to the side of the fan vents.

→ **Note:** If you cannot feel air flow from the vents, and the POWER and DIAG LEDs do not light or the DIAG LED does not turn off, turn the power switch to the OFF position. Wait one minute and then turn the power switch to the ON position. If the problem persists, contact the Nortel Networks Technical Response Center.

To power off, press the switch to the Off position (0); toggle the switch up.

Resetting the AN/DC or ANH-8/DC

You can use the Reset button to reboot the router hardware without cycling power, as follows:

• To *warm-boot* the router (no diagnostic tests run), press the Reset button for less than 3 seconds.

• To *cold-boot* the router (diagnostic tests run), press the Reset button for more than 3 seconds.

To activate the Reset button, use a small pointed object (for example, a paper clip) to press the button.

AN/DC Reset Switch

On the AN/DC, the Reset button is located on the back panel of the AN/DC (Figure 4-6). Labeled "RST," it resides between the console port and the LED labeled "RLSD2."
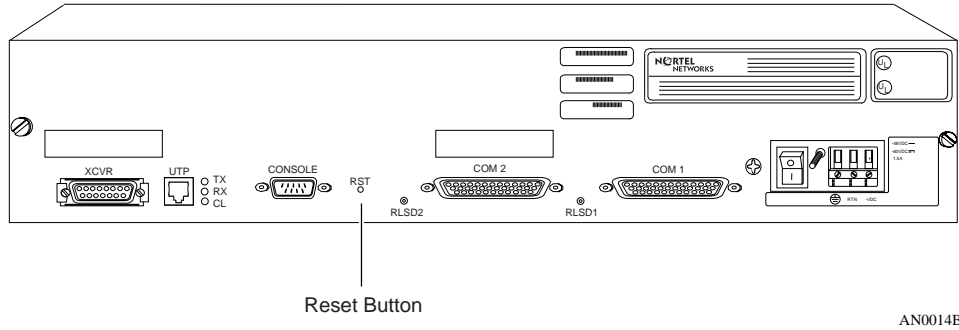
Figure 4-6.   AN/DC Reset Button

ANH-8/DC Reset Switch

On an ANH-8/DC, the Reset button is set inside the front panel (Figure 4-7).
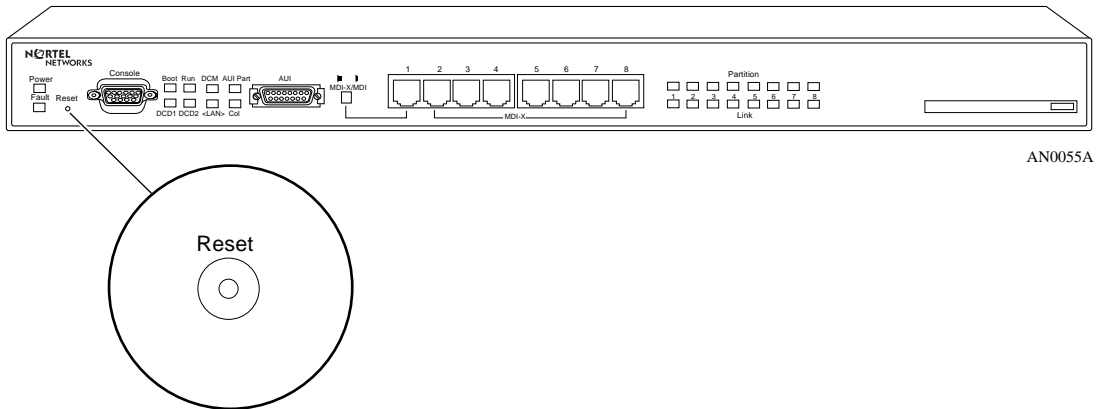
Figure 4-7.   ANH-8/DC Reset Button

➡ **Note:** The Link and Partition LEDs for repeater Ports 1-8 flash when you reset the ANH, whether or not a port has attached cables.

Removing a Flash Memory Card

When you remove a formatted memory card, the NVFS automatically removes access to the card. When you insert and format a card or insert an already formatted card, the NVFS automatically provides access.

To remove a memory card from an AN/DC or ANH-8/DC:

1. **Press the eject button adjacent to the card receptacle on the front panel.**

   Figure 4-8 shows the eject button on an AN/DC. Figure 4-9 shows the eject button on an ANH-8/DC.

Caution: Do not remove the Flash memory card while the router is operating, as this will interfere with current networking operations.
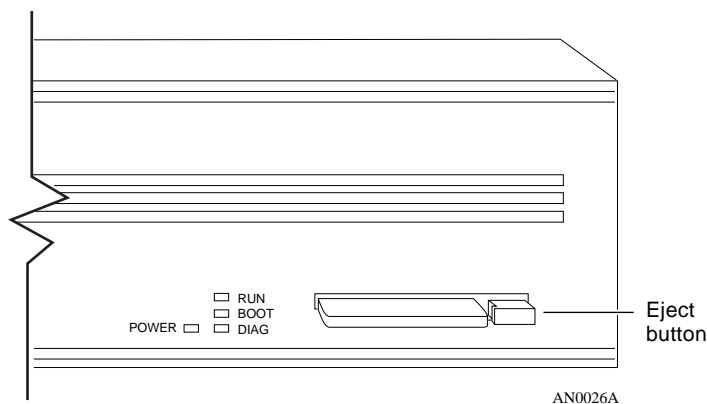
Figure 4-8.   AN/DC Flash Memory Card Eject Button
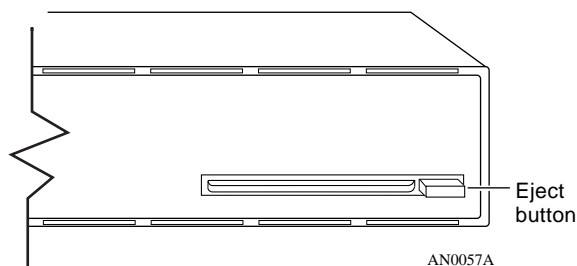
Figure 4-9.   ANH-8/DC Flash Memory Card Eject Button

2. **To insert another card into the receptacle, refer to "Installing the Flash Memory Card" in Chapter 3.**

Protecting Memory Card Files

Nortel Networks ships each memory card with its read-write protect switch in the unprotected position (Figure 4-10). After successfully loading the configuration file and saving your configuration, you may want to write-protect the memory card for backup purposes.

> **→** **Note:** You typically do not operate the router with a write-protected memory card. We recommend making a copy of your configuration on another memory card, write-protecting the card, and storing it in a safe place.

To change memory card protection:

1. **Remove the memory card as described in the previous section.**

2. **Adjust the read-write protect switch, which is located on the edge opposite the INSERT arrow of the memory card (Figure 4-10).**

Insert   Unprotected

Protected

6948
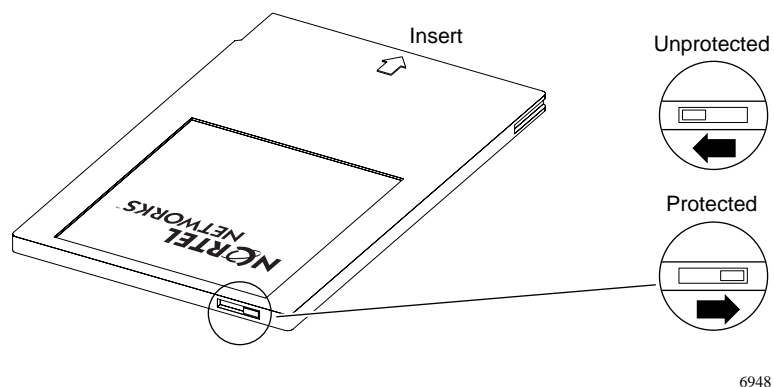
Figure 4-10.   Memory Card Read-Write Protect Switch

3. **Reinsert the memory card into the card receptacle.**

Appendix A
Configuring Netboot and Directed Netboot

You can use the following commands to configure the AN/DC or ANH-8/DC for Netboot and Directed Netboot:

- Use the **ifconfig** command to configure the router's initial IP interface to the network. You need this information to complete the procedure in "Continuing with Netboot" in Chapter 3.

- Use the **bconfig** command to specify the location and name of the AN/ANH software image and configuration file. You need this information to complete the procedure in "Continuing with Directed Netboot" in Chapter 3.

Contact your network administrator for additional assistance in determining the appropriate **ifconfig** command and **bconfig** command that you need for the AN/DC or ANH-8/DC at your site. (Your network administrator has information on these commands in *Connecting BayStack AN and ANH Systems to a Network*.)

Using the ifconfig Command

You use the **ifconfig** command to do the following:

- Configure the router's initial IP interface to the network. (Note that the initial IP interface should be a synchronous interface if you are using EZ-Install.) You also use the same procedure to configure other synchronous interfaces for the Netbooting procedure.

- Configure Ethernet interfaces for the Netbooting procedure.

- Enable or disable Netbooting on an interface.

The following sections describe each use of the **ifconfig** command.

Configuring a Synchronous IP Interface for Netbooting

To Netboot, you must first configure the router's initial IP interface to the network, using the following interface configuration command:

ifconfig [*synchronous options*] *<interface> <ip_addr> <subnet_mask>* [*<next_hop>*]

[*synchronous options*] indicates some combination of the following settings:

[**-d** | **-fr** [**-annexd** | **-annexa** | **-lmi**] | **-int_clk**]

⚠ **Note:** You must insert a space to separate each command option from the next.

After the initial configuration, you can use the same command format to configure other synchronous interfaces for Netbooting.

Table A-1 describes the **ifconfig** command arguments for configuring a synchronous interface.

Table A-1. The ifconfig Command Settings for a Synchronous Interface

Setting	Description
Default setting:	
-d	Resets the AN/DC or ANH-8/DC IP interface settings to the default values. This setting tries four WAN configurations in the following order until it finds the correct type for the router's connection to the network: 1. Nortel Networks HDLC encapsulation (also referred to as Nortel Networks Standard Point-to-Point) with external clocking 2. Frame Relay Annex D 3. Frame Relay LMI 4. Frame Relay Annex A
Frame Relay settings:	
-fr	Configures the synchronous port as a Frame Relay connection. With this setting, use one of the following options to specify a DLCMI setting: **-annexd**, **-annexa**, or **-lmi**.
-annexd **-annexa** **-lmi**	When one of these options is used with the **-fr** setting, it specifies a DLCMI setting. Use the same setting as the network to which the router's Frame Relay interface is connected. The default setting for Frame Relay is **-annexd**.

(continued)

Table A-1. **The ifconfig Command Settings for a Synchronous Interface** *(continued)*

Setting	Description
Internal clocking setting:	
-int_clk	Sets the synchronous port to internal clocking at 1.25 Mb/s. If you do not specify the **-int_clk** setting, the AN/DC or ANH-8/DC defaults to external clocking.
IP connector setting:	
<interface>	Specifies the type of IP connector you are configuring. Use **com1** or **com2** (for synchronous media).
IP address settings:	
<ip_addr>	Specifies the IP address of the interface you set with *<interface>*. Provide this address in dotted decimal notation.
<subnet_mask>	Specifies the IP subnet mask of the interface you selected with the *<interface>* setting. Provide this address in dotted decimal notation.
<next_hop>	Specifies the IP address of the next-hop router. Provide this address in dotted decimal notation. You need to specify this address only if there are intermediate routers between the AN/DC or ANH-8/DC and the BootP server.

Configuring an Ethernet Interface for Netbooting

To configure an Ethernet interface for Netbooting, use the following command format:

ifconfig [**-d**] *<interface>* [*<ip_addr>* *<subnet mask>*]

Table A-2 describes the **ifconfig** command arguments for configuring an Ethernet interface.

Table A-2. **The ifconfig Command Settings for an Ethernet Interface**

Setting	Description
Default setting:	
-d	Resets the IP interface settings to the default values. Resetting an Ethernet interface makes it inactive in the Netbooting process. (The output of the **getcfg** command shows the default as "None.")
IP connector setting:	
<interface>	Specifies the type of IP connector you are configuring. Use **xcvr1** or **xcvr2** (for Ethernet media).

(continued)

Table A-2.   **The ifconfig Command Settings for an Ethernet Interface** *(continued)*

Setting	Description
IP address settings:	
<ip_addr>	Specifies the IP address of the interface you set with *<interface>*. Provide this address in dotted decimal notation.
<subnet_mask>	Specifies the IP subnet mask of the interface you selected with the *<interface>* setting. Provide this address in dotted decimal notation.

Enabling and Disabling Interfaces with ifconfig

To enable or disable an interface for the Netboot process, use the following command formats:

ifconfig -disable *<interface>*
ifconfig -enable *<interface>*

<interface> specifies the type of IP connector you are enabling or disabling. Use **com1**, **com2,** or **com3** (for synchronous media), or **xcvr1** or **xcvr2** (for Ethernet media).

Using the bconfig Command

To use Directed Netboot, you must use the **bconfig** command to specify the following:

- The IP address of the server where the router's software image and configuration file reside

- The full pathnames of the software image and configuration file

You must use the **bconfig** command once to specify the location of the software image, and again to specify the location of the configuration file.

Use one of the following formats for the **bconfig** command:

bconfig [**image** | **config**] [**local** | **network** [*<tftp_host>* *<tftp_pathname>*]]
bconfig -d [**image** | **config**]

Table A-3 describes the **bconfig** command options.

Table A-3. The bconfig Command Options

Option	Description
image	Specifies information about the software image.
config	Specifies information about the configuration file.
local	Indicates that the specified file (image or config) resides in the router's local file system.
network	Indicates that the specified file resides on a network server.
<tftp_host>	Specifies the IP address of the host where the image or configuration file resides. If both the software image and configuration file reside on the network, the files must reside on the same host. In other words, you must specify the same IP address for the *tftp_host* for both files.
<tftp_pathname>	Specifies the complete pathname of the software image or configuration file on the host.
-d	Resets the default values for the software image or configuration file. The command **bconfig -d image** tells the router to look for the image file locally and nullifies the IP address and pathname for the file. The command **bconfig -d config** tells the router to obtain the configuration file over the network and nullifies the IP address and pathname for the file. Without the IP address and pathnames, the router uses Netboot rather than Directed Netboot. However, if you want to get one file locally while using Directed Netboot for the other file, you can use the **bconfig** command as the following examples show: **bconfig image local** **bconfig config network 21.3.5.62 /usr/anstartup/config** Or, **bconfig image network 21.3.5.62 /usr/mykernel.exe** **bconfig config local**

Appendix B
Using Local Boot (the Quick-Start Procedure)

You can local boot the AN/DC or ANH-8/DC using the Site Manager Quick-Start procedure explained in this appendix. You need this information to complete the procedure in "Continuing with Local Boot" on page 3-15 .

The Quick-Start procedure is the initial configuration that starts a Nortel Networks router running on the network. The procedure enables the Internet Protocol (IP) so that the router can connect to Site Manager.

Quick-starting basically consists of running the *install.bat* script and entering information at the prompts. The router automatically selects options for some prompts, and you can accept default values for many of the other prompts.

To assist you in answering Quick-Start prompts, we have included a series of worksheets for you to fill out with your network administrator's help. These worksheets contain all of the options that appear at each prompt, and space for you to record the options you select.

The last two sections in this appendix, Using the Quick-Start Commands" and Running the Quick-Start Script," provide additional information about the Quick-Start procedure.

It is very important that you fill out the worksheets and read all sections of this appendix before you begin the Quick-Start procedure.

➡ **Note:** Contact your network administrator for assistance in selecting worksheet options.

Filling Out the Quick-Start Worksheets

The *install.bat* script provides many options for configuring the router on a network.

→ **Note:** Because typical remote access uses a synchronous interface over a WAN connection, this section lists *only* the options involved with a synchronous configuration. When you configure a LAN interface, base your decision on the information provided with each *install.bat* prompt.

Use the following worksheets to organize your network information. Although this section has many worksheets, you only need to fill out

- One Global Information Worksheet. This worksheet lists options common to all synchronous interface configurations.

- One Router Protocol Worksheet. This worksheet lists specific options for RIP, OSPF, or Static Route configurations.

- One Wide Area Protocol Worksheet. This worksheet lists specific options for the Nortel Networks (proprietary) Point-to-Point Protocol (PPP), Frame Relay, PPP Standard, and Switched Multimegabit Data Service (SMDS) configurations.

We suggest the following procedure when filling out worksheets:

1. **Fill out the Global Information Worksheet completely.**

   (These options are the same for all synchronous interface configurations.)

2. **After recording your protocol selections on the Global Information Worksheet," fill out *only* the worksheets for these protocols in the Router Protocol Worksheets" and Wide Area Protocol Worksheets" sections.**

   For example, if you select RIP as your routing protocol and Frame Relay as your wide area protocol, you need only fill out the worksheets pertaining to these specific protocols.

3. **Go on to the sections Using the Quick-Start Commands" and Running the Quick-Start Script."**

Global Information Worksheet

This section contains the prompts and possible options relating to all AN/ANH synchronous configurations. Write your selection in the "Your Response" column.

Global Information Worksheet

Step	Requested Information	Options	Your Response
1	Specify the slot number where the Link Module resides.	Because the AN/DC and ANH-8/DC is not a Link Module, the script bypasses this step and automatically accepts a default slot of "1."	None.
2	Specify the Link Module and network interface information for the initial IP connection to Site Manager.	The script automatically provides a representative letter code. The network interface options are — Ethernet — Synchronous Select **S**, the letter associated with the synchronous interface.	
	Enter connector number [1]:	1. COM1 2. COM2 3. COM3	
	Enter clock source number [2]:	1. Internal 2. External	
	Enter circuit name [S#]:	The script recommends a circuit name for the COM interface that you select (for example, S11 for COM1 and S12 for COM2).	Press the Return key.

(continued)

Global Information Worksheet *(continued)*

Step	Requested Information	Options	Your Response
3	`Enter IP address in dotted decimal notation:`	Enter the IP address for the COM interface.	
	`Enter the subnetwork mask in dotted decimal notation:`	Enter the subnetwork mask for the COM interface IP address.	
	`Is the router connected to the same local area network as the Site Manager workstation? (y/n) [n]:`	y(es) n(o)	Press the Return key.
	`Enter routing protocol number [1]:`	1. RIP 2. OSPF 3. Static Route to Site Manager	(Complete the worksheet for the protocol you select.)
	`Enter wide area protocol number [1]:`	1. Nortel Networks Point-to-Point Protocol (Proprietary) 2. Frame Relay 3. Point-to-Point Protocol (PPP) Standard 4. Switched Multimegabit Data Service (SMDS)	(Complete the worksheet for the protocol you select.)
	`Do you wish to set SNMP community management? (y/n) [n]:`	y(es) n(o) Setting up SNMP community management is optional.	
4	`TFTP default volume [1]:`	The script automatically assigns the TFTP default volume to "1."	None
5	`Do you want to enable TELNET? (y/n) [n]:`	y(es) n(o) Enabling TELNET is optional.	
6	`FTP default volume [1]:`	The script automatically assigns the FTP default volume to "1."	
7	`Do you wish to save this configuration to a file? (y/n) [y]`	y(es) n(o)	Press the Return key.
	`Enter filename [startup.cfg]:`	We recommend using the default filename.	Press the Return key.

Router Protocol Worksheets

This section contains requested information and possible options relating to the routing protocol choices on the Global Information Worksheet.

RIP Worksheet

Requested Information	Options	Your Response
Should RIP listen to the default route? (y/n) [n]:	y(es) n(o) **Note:** RIP listens to a specific network or subnet route where Site Manager is located. Answering y(es) to this request forces RIP to also listen to the default route (0.0.0.0). This is useful when no specific route is available in the RIP updates that the router receives.	

OSPF Worksheet

Requested Information	Options	Your Response
Enter the OSPF router ID in dotted decimal notation [the router provides the IP address of the COM port]:	Enter an IP address to uniquely identify the router in the OSPF domain. We suggest using the default IP address provided.	
Enter the OSPF area ID in dotted decimal notation [0.0.0.0]:	Enter the area ID. This ID must match the area ID of the router's neighbor. **Note:** The backbone area ID is always 0.0.0.0.	
Enable Simple Password authentication? (y/n) [n]:	y(es) n(o) **Note:** If you answer y(es), the router requests a password.	Password: _____

(continued)

OSPF Worksheet *(continued)*

Requested Information	Options	Your Response
`Enter OSPF MTU size selection [1]:`	1. Default 2. Ethernet size (Nortel Networks Series 5 compatible) 3. User defined MTU	
`Enter OSPF interface type selection [1]:`	1. Broadcast 2. NBMA 3. Point-to-Point 4. Point-to-Multipoint 5. Point-to-Multipoint (STD) **Note:** When using a wide area protocol other than Nortel Networks Proprietary PPP, we suggest selecting NBMA.	
`Enter decimal value in seconds for Hello Interval [10]:` **Note:** This value must match all other interfaces in the OSPF area for connection to take place.	The script suggests the following intervals: Broadcast — 10 s Point-to-Point — 15 s NBMA — 20 s Point-to-MultiPoint —10 s	
`Enter decimal value in seconds for Router Dead Interval [40]:` **Note:** This value must match all other interfaces in the OSPF area for connection to take place.	The script suggests the following intervals: Broadcast — 40 s Point-to-Point — 60 s NBMA — 80 s Point-to-MultiPoint (STD) — 40 s	
`Enter decimal value for Router Priority [1]:` (For Broadcast, NBMA, or Point-to-Multipoint)	Enter a router priority value. The lower the value (above zero), the higher the priority. **Note:** If you set the router priority to zero (0), the router is not eligible to become the designated router on this particular network.	

(continued)

OSPF Worksheet *(continued)*

Requested Information	Options	Your Response
`Enter decimal value in seconds for Poll Interval [20]:` (For NBMA only)	Enter the largest number of seconds allowed between Hello packets that the router sends to an inactive NBMA neighbor. The router suggests a 20-second interval.	
`Enter IP address of neighbor in dotted decimal notation or enter` **q** `to quit:` (For NBMA only)	Enter addresses for all NBMA neighbors you want the router to communicate with. Enter **q** and press the Return key when you finish entering addresses.	
`Enter IP address of neighbor in dotted decimal notation:` (For PPP only)	Enter addresses for the PPP neighbor you want the router to communicate with.	

Static Route to Site Manager Worksheet

Requested Information	Options	Your Information
Destination Network [0.0.0.0]:	Enter the gateway address of the destination network. An address of 0.0.0.0 specifies the default route.	
Destination Network Mask [0.0.0.0]:	Enter the subnetwork mask of the destination network. A mask of 0.0.0.0 specifies the default route.	
Next-Hop Address:	Enter a next-hop address. All static routes require a next-hop address in the same subnet as the initial IP interface.	

Wide Area Protocol Worksheets

This section contains requested information and possible options relating to wide area protocol choices on the Global Information Worksheet.

Nortel Networks Proprietary PPP Worksheet

Requested Information	Options	Your Information
Enter BOFL (Breath of Life) timer value (1-60) [5]:	Enter the maximum amount of time that can elapse between the successful transmission of BofL messages.	
Enter Local Address Selection [3]:	1. DCE 2. DTE 3. EXPLICIT **Note:** Reverse local and remote address values when configuring the device at the other end of the circuit. (Exception: When connecting to a Series 5 router that uses DCE/DTE addressing, use the SAME local address value.)	

Frame Relay Worksheet

Requested Information	Options	Your Information
Enter Management type [3]:	1. DLCMI None 2. Rev 1 LMI 3. ANSI T1 617D 4. CCITT Annex A 5. LMI Switch 6. Annex D Switch 7. Annex A Switch	
Enter addressing type [4]:	1. ADDR Q.921 2. ADDR Q.922 (MARCH '90) 3. ADDR Q.922 (NOVEMBER '90) 4. ADDR Q.922	

Frame Relay Worksheet

Requested Information	Options	Your Information
`Enter address field length:`	2. Two Bytes 3. Three Bytes 4. Four Bytes	
`Enter DLCI number [30]:` (For DLCMI None, LMI Switch, Annex D Switch, and Annex A Switch only)	Enter the Permanent Virtual Circuit (PVC) number. **Note:** The valid range for the DLCI number is between 16 and 1007.	

PPP Standard Worksheet

Requested Information	Options	Your Information
`Enter Remote IP address in dotted decimal notation:`	Enter the IP address of the peer connection.	
`Do you wish to turn on the PPP echo function? (y/n) [n]:`	y(es) n(o)	
`Enable PAP (Password Authentication Protocol)? (y/ n) [n]:`	y(es) n(o) **Note:** If you answer y(es), the router requests a PAP ID and password for this interface. If you answer n(o), the router asks whether you want to enable CHAP.	
`Enable CHAP (Challenge Handshake Authentication Protocol)? (y/n) [n]:`	y(es) n(o) **Note:** If you answer y(es), the router requests a CHAP secret for this interface.	
`Does the Remote Peer have PAP authentication enabled? (y/n) [n]:`	y(es) n(o) **Note:** If you answer y(es), the router requests the PAP ID and password for the remote interface.	

PPP Standard Worksheet *(continued)*

Requested Information	Options	Your Information
Enable the LQR (Link Quality Reporting) Protocol? (y/n) [n]:	y(es) n(o) **Note:** Link Quality Monitoring on a Nortel Networks Series 5 router is not compatible with this feature.	
Enable use of the Remote Peer router's LQR Timer? (y/n) [y]: (For LQR Protocol only)	y(es) n(o) **Note:** If the LQR timer is enabled, the remote peer router maintains its own LQR timer for this interface. When the LQR timer is disabled, the AN is responsible for maintaining the timer for this interface.	
Number of seconds (1–120) [3]: (For LQR Protocol only)	Enter the maximum number of seconds between the transmission of LQR packets.	
Enter [inbound] success rate percentage (1–100) [90]:	Enter the minimal acceptable success rate (percentage) of packets transmitted by the peer router and received on this interface over the last five LQR reporting periods.	
Enter [outbound] success rate percentage (1–100) [90]	Enter the minimal acceptable success rate (percentage) of packets transmitted by this interface and received by the peer router over the last five LQR reporting periods.	

SMDS Worksheet

Requested Information	Options	Your Information
`Enter 10-digit individual address:`	Enter the individual address assigned to you by your SMDS service provider.	
`Enter 10-digit group address:`	Enter the group address assigned to you by your SMDS service provider.	
`Enter 10-digit arp address:`	Enter the Address Resolution Protocol (ARP) address assigned to you by your SMDS service provider.	

Using the Quick-Start Commands

Refer to the commands in when quick-starting the AN/DC or ANH-8/DC.

Table B-1.   Quick-Start Commands

To Do the Following	Action	Details
Accept a default value	Press **Return**	Your console displays default values in brackets; for example, [E11].
Repeat a step (for example, if you make a mistake)	Press **Control-c** Press **n**	When prompted `Terminate script y/n?` press the **n** key. You return to the beginning of the step so that you can reenter the information.
Stop the Quick-Start installation procedure	Press **Control-c** Press **y**	When prompted `Terminate script y/n?` press the **y** key. The Quick-Start procedure terminates and you return to the Technician Interface prompt. To restart the Quick-Start procedure, you must reboot the AN by typing **boot** and pressing the Return key.

Running the Quick-Start Script

After you enter **run install.bat**, the AN/DC or ANH-8/DC progresses through the Quick-Start script as follows:

1. The script begins prompting you for the initial Global Worksheet information.

2. After you select a router protocol option, the script prompts for specific protocol information.

3. After finishing the router protocol configuration, the script requests a wide area protocol selection.

4. After you select a wide area protocol, the script prompts for specific protocol information.

5. After finishing the wide area protocol configuration, the script prompts for the rest of the Global Worksheet information.

When the configuration is complete, the router runs through a test procedure for the IP interface. When the test is complete, the following prompt appears:

```
Enter IP address of Site Manager workstation:
```

Obtain this information from your network administrator.

Appendix C
Technical Specifications

This appendix provides

- [AN/DC Physical Specifications](#)
- [ANH-8/DC Physical Specifications](#)
- [Power Supply Specifications](#)
- [AN/DC Hardware Communications Options](#)
- [ANH-8/DC Hardware Communications Options](#)
- [Connector Pinouts](#)

AN/DC Physical Specifications

The dimensions and weight of the AN/DC are

- Height: 3.3 in. (8.4 cm)
- Width: 17.5 in. (44.5 cm)
- Depth: 9.5 in. (24.1 cm)
- Weight: 12 lb (5.4 kg)

ANH-8/DC Physical Specifications

The dimensions and weight of the ANH-8/DC are

- Height: 1.75 in. (4.5 cm)
- Depth: 11.25 in. (28.6 cm)
- Width: 17.25 in, (43.8 cm)
- Weight: approximately 7.5 lbs (3.2 kg)

Power Supply Specifications

Specifications for both the AN/DC AN and ANH-8/DC power supply:

- Nominal input voltage of -48 or -60 DC, +/- 20%

- 3 DC output voltages (5, 12, and 12), for a total output power of 43 watts with forced air cooling

AN/DC Hardware Communications Options

The AN/DC is available with one Ethernet AUI and two synchronous interfaces. As optional upgrades, the AN/DC also supports

- A third synchronous interface

- An ISDN BRI interface for direct (without terminal adapter) connection to the ISDN network

- A second Ethernet interface

- An Ethernet Data Collection Module (DCM) for gathering RMON statistics

➡ **Note:** When using an Ethernet DCM in the AN/DC, the AN/DC requires Router Software Version 9.00 or later and Site Manager Software Version 3.00 or later.

Table C-1 describes each interface.

Table C-1.   AN/DC Network Interfaces

Network Interface	Description
Ethernet and Second Ethernet	Supports the Ethernet and IEEE 802.3 standards that provide LAN connectivity. The Ethernet interfaces on an AN/DC include a 10Base-T (UTP) and an 802.3 AUI (XCVR) port; however, you can use only one port at a time. The UTP interface provides unshielded twisted-pair support; the XCVR interface provides broadband, baseband, fiber, and shielded twisted-pair support, depending on the transceiver and cabling you use.
Synchronous	Provides WAN connectivity. AN/DC models can have either two (COM1 and COM2) or three (COM1, COM2, and COM3) synchronous ports. (The third synchronous interface option is available on any AN/DC model that this guide describes.) Each port can operate independently with RS-232, RS-422, RS-449, V.28, V.35, and X.21 cables. Synchronous capability allows internal or external clocking.
ISDN BRI	Supports an S/T interface (an RJ-45 physical connector). The BRI provides 2 B channels, and supports full D-channel signaling and call setup/tear-down as defined in 1988 CCITT (now ITU-T) Q.921 and Q.931. For more information on ISDN, refer to *Configuring Dial Services*. Note that in the United States, an external NT-1 device is required to provide the U interface to the carrier network. The ISDN BRI option is available on any AN/DC model. Note that only one synchronous port, COM2, operates in AN/DC models that include ISDN BRI support.
Data Collection Module (DCM)	Gathers RMON statistics. Refer to *Connecting BayStack AN and ANH Systems to a Network* for information.

ANH-8/DC Hardware Communications Options

Every ANH-8/DC includes

- 9 Ethernet LAN repeater ports (1 AUI and 8 UTP)
- 2 synchronous wide area network (WAN) ports
- 1 local console service port

➡ **Note:** The Ethernet repeater ports operate as a single interface. Software configuration parameters (for example, the port IP address) apply to all ports.

With optional upgrades installed, the ANH-8/DC also supports

- An ISDN basic rate interface (BRI) for direct (without terminal adapter) connection to the ISDN network
- A third synchronous (COM3) port
- Second Ethernet nonrepeating 10Base-T (UTP-2) port
- An Ethernet Data Collection Module (DCM) for gathering RMON statistics

➡ **Note:** When using an N11 DCM, the ANH-8/DC requires Router Software Version 9.00 or later and Site Manager Software Version 3.00 or later.

Table C-2 summarizes the communications interfaces; the sections that follow describe each interface in more detail and provide cable and connector specifications. See Chapter 2 for information and illustrations about the front- and back-panel cable connections.

Table C-2.   ANH-8/DC Network Interfaces

Network Interface	Description
Ethernet	The ANH-8/DC supports eight 10Base-T UTP repeater ports and one 802.3 AUI port; however, you can use only one port at a time. These interfaces comprise a single managed segment, supporting the Ethernet and IEEE 802.3 standards that provide LAN connectivity. Some ANH-8/DC models also include an Ethernet UTP port on the back panel. This second Ethernet interface is not a repeater port.
Synchronous	Provides WAN connectivity via either two (COM1 and COM2) or three (COM1, COM2, and COM3) synchronous ports. Each port can operate independently with RS-232, RS-422, V.28, V.35, and X.21 cables. Synchronous capability allows internal or external clocking.
ISDN BRI	Supports an S/T interface (an RJ-45 physical connector). The BRI provides two B channels, and supports full D-channel signaling and call setup/tear-down as defined in 1988 CCITT Q.921 and Q.931. For more information on ISDN, refer to *Configuring Dial Services*. In the United States, an external NT-1 device is required to provide the U-interface to the carrier network.

Connector Pinouts

This section lists pinouts for the AN/DC and ANH-8/DC connectors:

- Attachment Unit Interface (AUI) Ports

- 10Base-T Repeater Ports (ANH-8/DC only)

- Synchronous Interfaces

- ISDN BRI Ports

- Local Console Connections

Attachment Unit Interface (AUI) Ports

The AN/DC back panel and ANH-8/DC front panel contains a standard 802.3 AUI DB-15 receptacle connector with a slide lock for connection to the AUI. You can use the Order No. 7115 Ethernet cable, described in the *Cable Guide for Routers and BNX Platforms*, for connections to this port.

The AUI transceiver (XCVR) port provides broadband, baseband, fiber, and shielded twisted-pair support, depending on the transceiver and cabling you use. The AUI interface connects internally to the Ethernet repeater.

➡ **Note:** The AUI port is designed only for connection to a transceiver. Connecting the AUI port directly to the AUI port on an Ethernet station (without a transceiver) violates IEEE 802.3 standards.

Table C-5 shows the pin assignment for the standard 15-pin AUI receptacle and identifies its pin locations.

Table C-3.   AUI Port Pin Assignments

Pin Assignment	Pin No.	Signal Name
	1	Ground
	2	CI-A
	3	DO-A
	4	Ground
	5	DI-A
Pin 8 ... Pin 1	6	+12 V dc Return
	7	(not connected)
	8	(not connected)
Pin 15 ... Pin 9	9	CI-B
	10	DO-B
	11	Ground
	12	DI-B
	13	+12 V dc
	14	Ground
	15	Ground

10Base-T Repeater Ports (ANH-8/DC only)
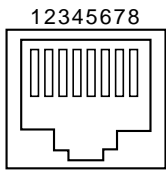
The eight Ethernet 10Base-T repeater port RJ-45 connectors on the ANH-8/DC front panel provide UTP support. The ANH-8/DC transmits the same information over each repeater port; it allows simultaneous connection to any of the eight 10Base-T ports or AUI port.

Each of the eight shielded RJ-45 jacks is a 10Base-T port using the standard media-dependent interface with internal crossover (MDI-X) pin assignment. Each port detects the polarity of the circuit connected to RD Pins 1 and 2 and adjusts polarity as necessary to correctly complete this circuit.

The UTP repeater Ports 2 through 8 are fixed with internal crossover connection or media-dependent interface with crossover (MDI-X). This means that you use a straight-through cable when connecting to other network resources (for example, workstations or other nonrepeating devices).

Table C-4 shows the RJ-45 pin assignments for the eight front-panel 10Base-T ports and identifies the pin locations.

Table C-4.   RJ-45 Jacks Pin Assignments

Pin Assignment	Pin No.	MDI-X Signal (Function)	MDI Signal (Function)
12345678	1	RD + (Receive from UTP wire)	TD + (Transmit to UTP wire)
	2	RD – (Receive from UTP wire)	TD– (Transmit to UTP wire)
	3	TD + (Transmit to UTP wire)	RD + (Receive from UTP wire)
	4	Not used by 10Base-T	Not used by 10Base-T
	5	Not used by 10Base-T	Not used by 10Base-T
	6	TD – (Transmit to UTP wire)	RD – (Receive from UTP wire)
	7	Not used by 10Base-T	Not used by 10Base-T
	8	Not used by 10Base-T	Not used by 10Base-T

Synchronous Interfaces

The AN/DC and ANH-8/DC support two synchronous interfaces, labeled COM1 and COM2. Systems with a Third Synchronous Interface or ISDN BRI upgrade module support a third synchronous port.

The synchronous interfaces provide multiprotocol WAN connection through DB-44 receptacle connectors. Each synchronous interface can operate independently with RS-232, RS-422, V.35, and X.21 electrical interfaces at transmission rates from 1200 b/s to 2.048 Mb/s. When used with standard keyed cables, the ports automatically configure to the desired electrical interface.

You can use the following cables, described in the *Cable Guide for Routers and BNX Platforms*:

- V.35 connections -- Order No. 7220

- X.21 connections -- Order No. 7224

- RS-422 connections -- Order No. 7318

- RS-232 connections -- Order No. 7826

Table C-5 shows the signal and pin assignments for these connectors.

Table C-5.   Synchronous Port Pin Assignments

Pin Assignment	Pin No.	Signal Name	Pin No.	Signal Name
	1	FGND	23	DCD-
	2	SD+	24	ST-
	3	RD+	25	RT-
	4	RTS+	26	TT-
	5	CTS+	27	NC
	6	DSR+	28	RTIN#B
	7	SGND	29	CTSIN#
	8	DTR+	30	ST#
	9	DCD+	31	VST-
	10	ST+	32	VST+
	11	RT+	33	VRT-
	12	TT+	34	VRT+
	13	RTIN#	35	VRD-
	14	CTS#	36	VSD-
	15	RTS#	37	VRD+
	16	SD-	38	VSD+
	17	RD-	39	VTT-
	18	RTS-	40	VTT+
	19	CTS-	41	UNBE
	20	DSR--	42	V35D
	21	NC	43	GND
	22	DTR-	44	SNDC

Pin 15 — Pin 1
Pin 30 — Pin 16
Pin 44 — Pin 31
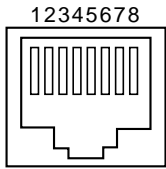
ISDN BRI Ports

The AN/DC and ANH-8/DC support the BRI standard for ISDN using an optional ISDN/BRI module. The integrated ISDN BRI functionality allows you to connect directly to the ISDN network, as opposed to connecting via a terminal adapter. This solution reduces equipment costs and simplifies connection to an ISDN switch.

The BRI implementation supports two dial service applications: dial-on-demand and dial backup. *Configuring Dial Services* describes these services and how to configure them for connection to an ISDN network.

Table C-6 lists the ISDN connector pinouts.

Table C-6.   ISDN Connector Pinouts

Pin Assignment	Pin No.	Signal
12345678	1	No connection
	2	No connection
	3	Tx +
	4	Rx +
	5	Tx -
	6	Rx -
	7	No connection
	8	No connection

Local Console Connections

The AN/DC and ANH-8/DC front panel contains one service interface, labeled Console; its DB-9 plug connector provides an RS-232-D serial connection. You use this local console port to connect
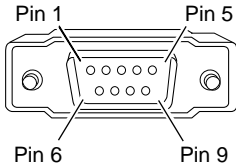
- Any VT100-compatible console device for direct console access

- Any Hayes-compatible modem for remote dial-in access

The AN/DC and ANH-8/DC shipping package includes the Order No. 110310 console/modem kit for connecting devices to the Console port.

- To connect a modem to the Console port, use the Order No. 110307 cable, a standard, 15-foot molded AT serial cable with DB-9 receptacle to DB-25 plug connectors.

- To connect a terminal to the Console port, use the complete console/modem kit (the Order No. 110307 cable with the Order No.110308 null modem adapter).

- To connect an IBM-compatible PC to the Console port, use the complete console/modem kit (Order No. 110308 cable and Order No. 110307 null modem adapter) plus a standard AT serial cable with one DB-25 plug connector, supplied with the PC.

The connector pin assignment described in Table C-7 shows signal and pin assignments for the service port.

Table C-7.   Service (Console) Port DB-9 Pin Assignments

Pin Assignment	Pin No.	Signal Name	Direction
	1	Not used	N/A
	2	Transmit data, TXD	To terminal
	3	Receive data, RXD	From terminal
Pin 1 Pin 5	4	RTS	To terminal
	5	CTS	From terminal
	6	DSR	From terminal
Pin 6 Pin 9	7	Ground	N/A
	8	DCD	From terminal
	9	DTR	To terminal

Appendix D
Requirements for European Operation

This appendix provides information required for operating the AN/DC and ANH-8/DC in Europe.

ANH-8/DC Safety Status

Tables D-1, D-2, and D-3 list the safety status of interconnection points to the connection of other equipment.

Table D-1. Safety Status (Order Nos. AE1001041, AE1001042, AE1001043, and AE1001044)

Port Location	Port Description	Type of Circuit
COM1	V.28, X.21, V.35	TNV (Telecommunications Network Voltage) at SELV (Safety Extra-Low Voltage) levels
COM2	V.28, X.21, V.35	TNV at SELV levels
Console	V.28	SELV
AUI	Ethernet AUI	SELV
UTP1-8	Ethernet 10Base-T	SELV

Table D-2. Safety Status (Order Nos. AE0004005, AE0011012, and AE0011020)

Port Location	Port Description	Type of Circuit
COM3	V.28, X.21, V.35	TNV at SELV levels

Table D-3.   Safety Status (Order Nos. AE0004006, AE0011013, and AEE0011019)

Port Location	Port Description	Type of Circuit
ISDN	BRI ISDN	TNV at SELV levels
P6	Host Port	SELV

AN/DC Safety Status

Table D-4 lists the safety status of interconnection points to the connection of other equipment.

Table D-4.   Safety Status (Order Nos. AE1001037, AE1001038, AE1001039, and AE1001040)

Port Location	Port Description	Type of Circuit
COM1	V.28, X.21, V.35	TNV at SELV levels
COM2	V.28, X.21, V.35	TNV at SELV levels
Console	V.28	SELV
XCVR	Ethernet AUI	SELV
UTP	Ethernet 10Base-T	SELV

Safety Status (Third Synchronous Interface Module)

Order Nos. 24001, 50025, and 24001-S are upgrade options that provide a third synchronous interface. These options can be installed in any AN model.

Table D-5 lists the safety status of the interconnection point (COM3) provided by Order Nos. 24001, 50025, and 24001-S to the connection of other equipment.

Table D-5.   Safety Status (Order Nos. 24001, 50025, and 24001-S)

Port Location	Port Description	Type of Circuit
COM3	V.28, X.21, V.35	TNV at SELV levels

Synchronous Cabling Requirements

Refer to [Figure D-1](#) through [Figure D-3](#) and [Table D-6](#) through [Table D-8](#) for synchronous interface cabling information.

Note the following compliance requirements:

- V.28 compliance requires the use of an Order No. 7837 cable

- V.35 compliance requires the use of an Order No. 7220 cable

- X.21 compliance requires the use of an Order No. 7224 cable
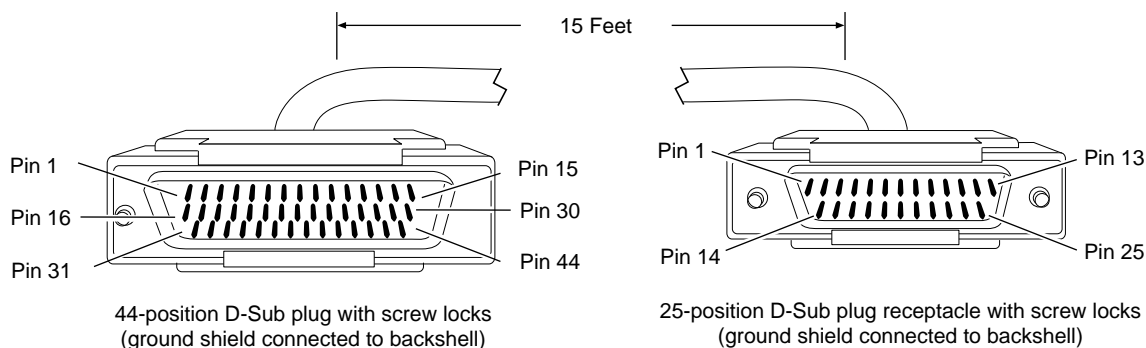
Figure D-1.   Cable 7837 (V.28 Compliant)

Table D-6.   WAN Interface (Order No. 7837)

Nortel Networks Termination		Remote Termination	
Pin	Signal	Pin	Signal
1	Frame Ground	1	Frame Ground
2	Send Data+	2	Send Data
3	Receive Data+	3	Receive Data
4	Request to Send+	4	Request to Send
5	Clear to Send+	5	Clear to Send
6	Data Set Ready+	6	Data Set Ready
8	Data Terminal Ready+	20	Data Terminal Ready

(continued)

Table D-6.   WAN Interface (Order No. 7837) *(continued)*

Nortel Networks Termination		Remote Termination	
9	Data Carrier Detect+	8	Data Carrier Detect
10	Send Timing+	15	Send Timing
11	Receive Timing+	17	Receive Timing
12	Transmitter Signal Element Timing+	24	Transmitter Signal Element Timing
7	Signal Ground	7	Signal Ground
Local Wire Connections			
Pin 7 > 19 > 20 > 23			
Pin 13 > 28			
Pin 14 > 29			
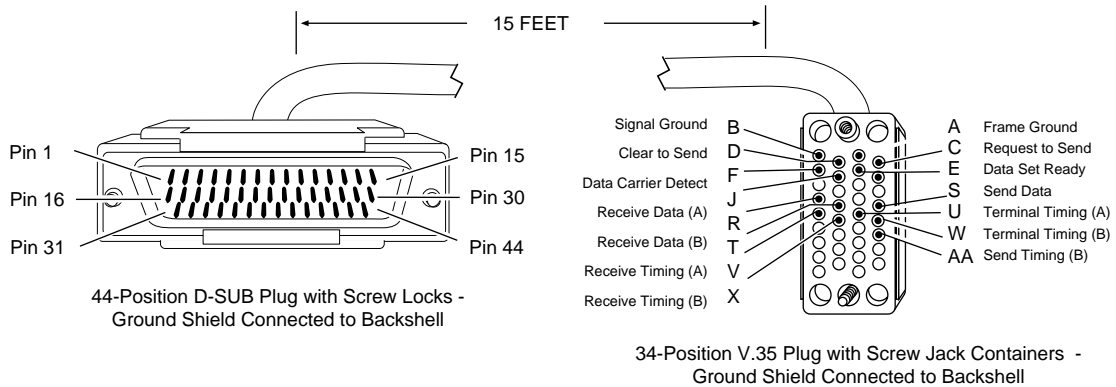
AN0077A

Figure D-2.   Cable 7220 (V.35 Compliant)

Table D-7.   V.35 Interface (Order No. 7220)

Nortel Networks Termination		Remote Termination	
Pin	**Signal**	**Pin**	**Signal**
38	VSD+	P	Send Data A
36	VSD-	S	Send Data B
34	VRT+	V	Receive Timing A
33	VRT-	X	Receive Timing B
32	VST+	Y	Send Timing A
31	VST-	AA	Send Timing B
37	VRD+	R	Receive Data A
35	VRD-	T	Receive Data B
6	Data Set Ready+	E	Data Set Ready
8	Data Terminal Ready+	H	Data Terminal Ready
4	Request to Send+	C	Request to Send
5	Clear to Send+	D	Clear to Send
40	VTT+	U	Terminal Timing A
39	VTT-	W	Terminal Timing B
1	Frame Ground	A	Frame Ground
9	Data Carrier Detect+	F	Data Carrier Detect
19	Signal Ground	B	Signal Ground
Local Wire Connections			
Pin 19 > 20 > 23 > 7			
Pin 41 > 42 > 43			
Pin 13 > 28			
Pin 14 > 29			

44-position D-SUB plug with screw locks -
ground shield connected to backshell

25-position D-SUB plug with screw locks -
ground shield connected to backshell
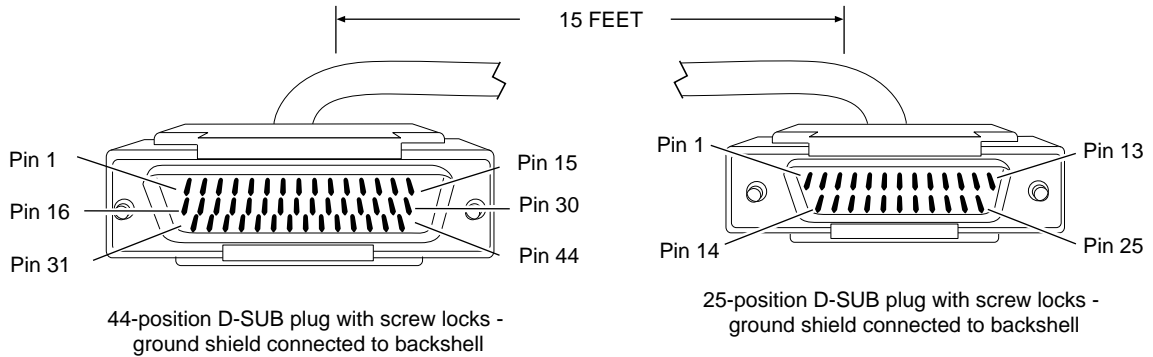
AN0078A

Figure D-3.   Cable 7224 (X.21 Compliant)

Table D-8.   X.21 Interface (Order No. 7224)

Nortel Networks Termination		Remote Termination	
Pin	**Signal**	**Pin**	**Signal**
2	Send Data+	2	Send Data+
16	Send Data-	9	Send Data-
4	Request to Send+	3	Request to Send+
18	Request to Send-	10	Request to Send-
3	Receive Data+	4	Receive Data+
17	Receive Data-	11	Receive Data-
9	Data Carrier Detect+	5	Data Carrier Detect+
23	Data Carrier Detect-	12	Data Carrier Detect-
10	Send Timing+	6	Send Timing
24	Send Timing-	13	Receive Timing
7	Signal Ground	8	Signal Ground
1	Frame Ground	1	Frame Ground
Local Wire Connections			
Pin 41 > 43			
Pin 28 > 30			
Pin 14 > 15			

ISDN BRI Requirements

The ISDN BRI module (Order Nos. AE0004006, AE0011013, and AE0011019 for the ANH-8/DC) and ISDN BRI upgrade module (Order Nos. 24000, 24000-S, and 50022 for the AN/DC) are approved only for installation in a host, and with host attachments, which are either type approved for such apparatus or, if supplied after 1st March 1989, are marked with or supplied with a statement that the host is supplied under the terms of General Approval Number NS/G/1234/J/100003.

Installation of the ISDN BRI module in any ANH-8/DC chassis (Order Nos. AE1001041, AE1001042, AE1001043, and AE1001044) complies with all requirements listed in this section. Installation of the ISDN BRI upgrade module in any AN complies with all requirements listed in this section.

Power Requirements

The ISDN BRI is powered from the host chassis and has the power requirements shown in Table D-9.

Table D-9.   ISDN BRI Power Requirements

Voltage	Amperage
+5 V	1 A
+12 V	0.15 A
-12 V	0.15 A

The power drawn from the host chassis combined with that required for any other cards and accessories must be within the power rating of the host chassis.

You must install the ISDN BRI upgrade module in an AN in such a way as to not impair the integrity of the network protection from hazardous voltages used or generated internally by the host chassis.

ISDN BRI Clearances and Creepage Distances

The clearances and creepage distances (shown as X and Y, respectively, in Figure D-4 and Table D-10) must be maintained between the card and

- The host chassis in which it is installed

- Any adjacent cards installed in the host chassis

The exception to this rule is the edge connector, which resides in the host chassis backplane where no minimum distance applies.
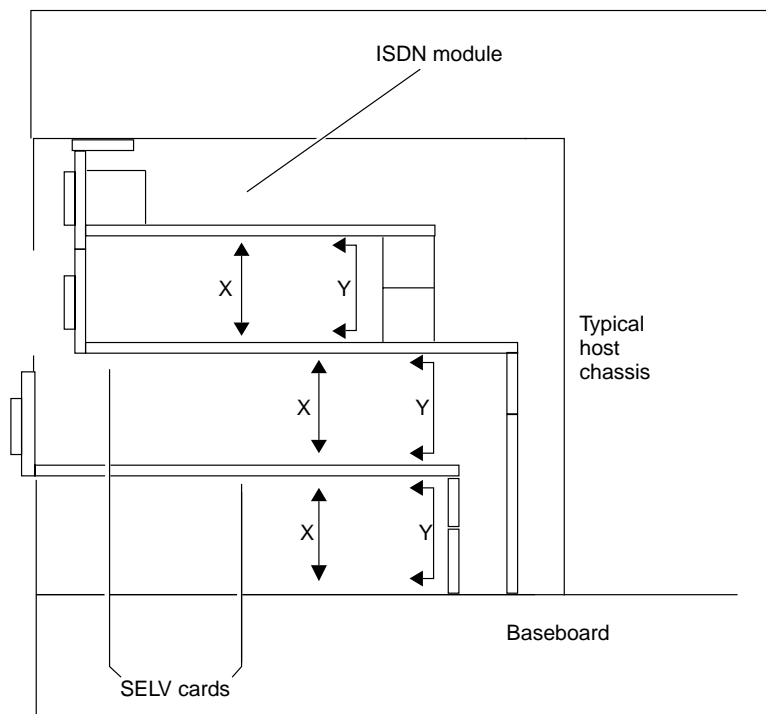
AN0034A

Figure D-4.   ISDN BRI Clearances and Creepage Distances

Table D-10.   ISDN BRI Clearances and Creepage Distances

Clearance (X)	Creepage (Y)	Voltage used or generated by other parts of the host or expansion card
2.0 mm	2.4 (3.8) mm	Up to 50 V rms or V dc
2.6 mm	3.0 (4.8) mm	Up to 125 V rms or V dc
4.0 mm	5.0 (8.0) mm	Up to 250 V rms or V dc
4.0 mm	6.4 (10.0) mm	Up to 300 V rms or V dc

The creepage distances apply to the normal office environment. When the local environment within the host chassis is subject to conductive pollution or dry nonconductive pollution that could become conductive due to condensation, the creepage distances shown in parentheses in Table D-10 will apply.

The clearance and creepage distance between adjacent points should be checked as follows:

- The clearance distance (X) is the shortest distance measured between two points through the air.

- The creepage distance (Y) is the shortest distance between two points measured across a surface.

You should obtain advice from a competent telecommunications safety engineer if in doubt. Failure to install the ISDN BRI according to these instructions will invalidate the General Approval.

ISDN BRI Upgrade Module Safety Status

Table D-11 lists the safety status of interconnection points to the connection of other equipment.

Table D-11.   ISDN BRI Safety Status (Order Nos. 24000, 24000-S, 50022, AE0004006, AE0011013, and AE0011019)

Port Location	Port Description	Type of Circuit
ISDN	BRI ISDN	TNV at SELV levels
P6	Host Port	SELV

ISDN BRI Connector Pinouts

Table D-12 lists the ISDN connector pinouts.

Table D-12. ISDN Connector Pinouts

Pin	Signal
1	No connection
2	No connection
3	Tx +
4	Rx +
5	Tx -
6	Rx -
7	No connection
8	No connection

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